UCD: Perinatal Research - Chiller Replacement

January 24, 2020

PROJECT NO. 19461

Submitted by:

MEP ENGINEERING, INC.

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Electronic versions of all State Buildings (SBP) forms can be found at:
http://www.colorado.gov/cs/Satellite/DPA-EO/DEO/1251570153297

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

INFORMATION FOR BIDDERS

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus
Project No./Name: 20-115536 / Perinatal Replace Chiller 2

1. **BID FORM:** Bidders are required to use the Bid form attached to the bidding documents. Each bidder is required to bid on all alternates and indicate the time from the date of the Notice to Proceed to Substantial Completion in calendar days, and in addition, the bidder is required to indicate the period of time to finally complete the project from Substantial Completion to Final Acceptance, also in calendar days. Bids indicating times for Substantial Completion and Final Acceptance in excess of the number of days indicated in the Advertisement for Bids for completion of the entire Project may be found non-responsive and may be rejected. The bid shall not be modified or conditioned in any manner. Bids shall be submitted in sealed envelopes bearing the address and information shown below. If a bid is submitted by mail, this aforementioned sealed envelope should be enclosed in an outer envelope and sent to the following addressee:

   INSERT NAME OF AGENCY AND ADDRESS WHERE BID SHOULD BE DELIVERED
   The outside of the sealed inner envelope should bear the following information:

   Project # 20-115536
   Project Name Perinatal Replace Chiller 2
   Name and Address of Bidder _____
   _____

   Date of Opening _____
   Time of Opening _____

2. **INCONSISTENCIES AND OMISSIONS:** Bidders may request clarification of any seeming inconsistencies, or matters seeming to require explanation, in the bidding documents at least three (3) business days prior to the time set for the opening of Bids. Decisions of major importance on such matters will be issued in the form of addendum.

3. **APPLICABLE LAWS AND REGULATIONS:** The bidder's attention is called to the fact that all work under this Contract shall comply with the provisions of all state and local laws, approved state building codes, ordinances and regulations which might in any manner affect the work to be done or those to be employed in or about the work. Attention is also called to the fact that the use of labor for work shall be governed by the provisions of Colorado law which are hereinafter set forth in Articles 27 and 52E of the GENERAL CONDITIONS.

4. **UNAUTHORIZED IMMIGRANTS:** Note that the Special Provisions of the General Conditions of the Contract includes the following language: PUBLIC CONTRACTS FOR SERVICES - CRS 8-17.5-101 and PUBLIC CONTRACTS WITH NATURAL PERSONS - 24-76.5-101. The Contractor certifies that the Contractor shall comply with the provisions of CRS 8-17.5-101 et seq. The Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract or enter into a contract with a subcontractor that fails to certify to the Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. The Contractor represents, warrants, and agrees that it (i) has verified that it does not employ any illegal aliens, through participation in the Basic Pilot Employment Verification Program administered by the Social Security Administration and Department of Homeland Security, and (ii) otherwise will comply with the requirements of CRS 8-17.5-102(2)(b). The Contractor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and Employment. If the Contractor fails to comply with any requirement of this provision or CRS 8-17.5-101 et seq., the State may terminate this contract for breach and the Contractor shall be liable for actual and consequential damages to the State.

   A Contractor that operates as a sole proprietor hereby swears or affirms under penalty of perjury that the Contractor (i) is a citizen of the United States or otherwise lawfully present in the United States pursuant to federal law, (ii) shall comply with the provisions of CRS 24-76.5-101 et seq, and (iii) shall produce one of the

forms of identification required by CRS 24-76.5-103 prior to the effective date of this Contract. Except where exempted by federal law and except as provided in CRS 24-76.5-103(3), a Contractor that receives federal or state funds under this contract must confirm that any individual natural person eighteen years of age or older is lawfully present in the United States pursuant to CRS 24-76.5-103(4) if such individual applies for public benefits provided under this contract.

5. **TAXES:** The bidder's attention is called to the fact that the Bid submitted shall exclude all applicable federal excise or manufacturers' taxes and all state sales and use taxes as hereinafter set forth in Article 9C of the GENERAL CONDITIONS.

6. **OR EQUAL:** The words "OR EQUAL" are applicable to all specifications and drawings relating to materials or equipment specified. Any material or equipment that will fully perform the duties specified, will be considered "equal", provided the bid submits proof that such material or equipment is of equivalent substance and function and is approved, in writing. Requests for the approval of "or equal" shall be made in writing at least five (5) business days prior to bid opening. During the bidding period, all approvals shall be issued by the Architect/Engineer in the form of addenda at least two (2) business days prior to the bid opening date.

7. **ADDENDA**: Owner/architect initiated addenda shall not be issued later than two (2) business days prior to bid opening date. All addenda shall become part of the Contract Documents and receipt must be acknowledged on the Bid form.

8. **METHOD OF AWARD - LOWEST RESPONSIBLE BIDDER:** If the bidding documents for this project require alternate prices, additive and/or deductible alternates shall be listed on the alternates bid form provided by the Principal Representative. Bidders should note the Method of Award is applicable to this Bid as stated below.

   A. **DEDUCTIBLE ALTERNATES:** The lowest responsible Bid, taking into account the Colorado resident bidder preference provision of Colorado law, will be determined by and the contract will be awarded on the base bid combined with deductible alternates, deducted in numerical order in which they are listed in the alternates bid form provided by the Principal Representative. The subtraction of alternates shall result in a sum total within available funds. If this bid exceeds such amount, the right is reserved to reject all bids. An equal number of alternates shall be subtracted from the base bid of each bidder within funds available for purposes of determining the lowest responsible bidder.

   B. **ADDITIVE ALTERNATES:** The lowest responsible Bid, taking into account the Colorado resident bidder preference provision of Colorado law, will be determined by and the contract will be awarded on the base bid plus all additive alternates added in the numerical order in which they are listed in the alternates bid form provided by the Principal Representative. The addition of alternates shall result in a sum total within available funds. If this bid exceeds such amount, the right is reserved to reject all bids. An equal number of alternates shall be added to the base bid of each bidder within funds available for purposes of determining the lowest responsible bidder.

   C. **DEDUCTIBLE AND ADDITIVE ALTERNATES:** Additive alternates will not be used if deductible alternates are used and deductible alternates will not be used if additive alternates are used.

9. **NOTICE OF CONTRACTOR'S SETTLEMENT** – Agencies/institutions must indicate in the initial Solicitation (Advertisement for Bids, Documented Quotes, or Requests for Proposals) whether settlement will be advertised in newspapers or electronic media.

The Advertisement for Bids can be located at the web site: /www.colorado.gov/pacific/osa/cdnotices
(Click on the appropriate link [ColoradoVSS or ColoradoBIDS] or on the State Purchasing Office website)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID

Institution/Agency: University of Colorado Denver / GFE

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

Bidder Acknowledges Receipt of Addenda Numbers:	
Bidder Anticipates Services outside the United States or Colorado:	No ☐ Yes ☐ If Yes see 3A below
Bidder will comply with 80% Colorado Labor on project above $500,000:	Yes☐ No ☐ If No see 3B below
Bidder is a Service-Disabled Veteran Owned Small Business:	No ☐ Yes ☐ If Yes see 3C below

Base Bid $

(Refer to Bid Alternate Form SC-6.13.1 Attached, If Applicable)

Bidder's Time of Completion

a. Time Period from Notice to Proceed to Substantial Completion:

b. Time Period from Substantial Completion to Final Acceptance:

c. Total Time of Completion of Entire Project (a + b):

1. **BID:** Pursuant to the advertisement by the State of Colorado dated _____ the undersigned bidder hereby proposes to furnish all the labor and materials and to perform all the work required for the complete and prompt execution of everything described or shown in or reasonably implied from the Bidding Documents, including the Drawings and Specifications, for the work and for the base bid indicated above. Bidders should include all taxes that are applicable.
2. **EXAMINATION OF DOCUMENTS AND SITE:** The bidder has carefully examined the Bidding Documents, including the Drawings and Specifications, and has examined the site of the Work, so as to make certain of the conditions at the site and to gain a clear understanding of the work to be done.
3. **PARTIES INTERESTED IN BID:** The bidder hereby certifies that the only persons or parties interested in this Bid are those named herein, and that no other bidder or prospective bidder has given any information concerning this Bid.
   - **A.** If the bidder anticipates services under the contract or any subcontracts will be performed outside the United States or Colorado, the bidder shall provide in a written statement which must include, but need not be limited to the type of services that will be performed at a location outside the United States or Colorado and the reason why it is necessary or advantageous to go outside the United States or Colorado to perform such services. (Does not apply to any project that receives federal moneys)
   - **B.** For State Public Works projects per C.R.S. 8-17-101, Colorado labor shall be employed to perform at least 80% of the work. Colorado Labor means any person who is a resident of the state of Colorado at the time of the Public Works project. Bidders indicating that their bid proposal will not comply with the 80% Colorado Labor requirement are required to submit written justification along with the bid submission. (Does not apply to any project that receives federal moneys**–**
   - **C.** A Service-Disabled Veteran Owned Small Business (SDVOSB) per C.R.S. 24-103-211, means a business that is incorporated or organized in Colorado or maintains a place of business or has an office in Colorado and is officially registered and verified by the Center for Veteran Enterprise within the U.S. Department of Veteran Affairs. Attach proof of certification along with the bid submission.
4. **BID GUARANTEE:** This Bid is accompanied by the required Bid Guarantee. You are authorized to hold said Bid Guarantee for a period of not more than thirty (30) days after the opening of the Bids for the work above indicated, unless the undersigned bidder is awarded the Contract, within said period, in which event the Director, State Buildings Programs, may retain said Bid Guarantee, until the undersigned bidder has executed the required Agreement and furnished the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance and Affidavit Regarding Unauthorized Immigrants.
5. **TIME OF COMPLETION: The bidder agrees to achieve Substantial Completion of the Project from the date of the Notice to Proceed within the number of calendar days entered above, and in addition, further agrees that the period between Substantial Completion and Final Acceptance of the Project will not exceed the number of**

calendar days noted above. If awarded the Work, the bidder agrees to begin performance within ten (10) days from the date of the Notice to Proceed subject to Article 46, Time of Completion and Liquidated Damages of The General Conditions of the Contract, and agrees to prosecute the Work with due diligence to completion. The bidder represents that Article 7D of the Contractor's Agreement (SC-6.21) has been reviewed to determine the type and amount of any liquidated damages that may be specified for this contract.

6. **EXECUTION OF DOCUMENTS:** The bidder understands that if this Bid is accepted, bidder must execute the required Agreement and furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance and Affidavit Regarding Unauthorized Immigrants within ten (10) days from the date of the Notice of Award, and that the bidder will be required to sign to acknowledge and accept the Contract Documents, including the Drawings and Specifications.
7. **ALTERNATES:** Refer to the Information for Bidders (SC-6.12) for Method of Award for Alternates and use State Form SBP-6.13.1 Bid Alternates form to be submitted with this bid form if alternates are requested by the institution/agency in the solicitation documents.
8. **Submit wage rates** (direct labor costs) for prime contractor and subcontractor as requested by the institution/agency in the solicitation documents.
9. **The right is reserved to waive informalities and to reject any and all Bids.**

SIGNATURES: If the Bid is being submitted by a Corporation, the Bid shall be signed by an officer, i.e., President or Vice-President. If a sole proprietorship or a partnership is submitting the Bid, the Bid shall so indicate and be properly signed.

Dated this _____ Day of _____ , 20_____

THE BIDDER:

Company Name	Address (including city, state and zip)
Phone number:	
Name (Print) and Title	Signature

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID ALTERNATES FORM

Institution/Agency: University of Colorado Denver
Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

Additive alternates will not be used if deductible alternates are used and deductible alternates will not be used if additive alternates are used.

Additive Alternates (If Applicable)
Refer to specification section _____ for descriptions of add alternates. If the add alternates are accepted, the base bid would be modified by the amount entered by the bidder.

A.A. No. 1	_____	Add $ _____
A.A. No. 2	_____	Add $ _____
A.A. No. 3	_____	Add $ _____
A.A. No. 4	_____	Add $ _____
A.A. No. 5	_____	Add $ _____
A.A. No. 6	_____	Add $ _____
A.A. No. 7	_____	Add $ _____
A.A. No. 8	_____	Add $ _____
A.A. No. 9	_____	Add $ _____
A.A. No. 10	_____	Add $ _____

Deductive Alternates (If Applicable)

Refer to specification section _____ for descriptions of the deductive alternates. If the deductive alternates are accepted, the base bid would be modified by the amount entered by the bidder.

D.A. No. 1	_____	Deduct $ _____
D.A. No. 2	_____	Deduct $ _____
D.A. No. 3	_____	Deduct $ _____
D.A. No. 4	_____	Deduct $ _____
D.A. No. 5	_____	Deduct $ _____
D.A. No. 6	_____	Deduct $ _____
D.A. No. 7	_____	Deduct $ _____
D.A. No. 8	_____	Deduct $ _____
D.A. No. 9	_____	Deduct $ _____
D.A. No. 10	_____	Deduct $ _____

THE BIDDER:

_____
Company Name

_____
Signature Date

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID BOND

Institution/Agency: University of Colorado Denver
Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, _____ hereinafter called the "PRINCIPAL", is submitting a PROPOSAL for the above described project, to the STATE OF COLORADO, hereinafter called the "OBLIGEE".

WHEREAS, the Advertisement for Bids has required as a condition of receiving the Proposals that the Principal submit with the PROPOSAL GUARANTY in an amount not less than five per cent (5%) of the Proposal, which sum it is specifically agreed is to be forfeited as Liquidated Damages in the event that the Principal defaults in his obligation as hereinafter specified, and, in pursuance of which Requirement, this Bid is made, executed and delivered.

NOW THEREFORE, the Principal and _____ a corporation of the State of _____ _____, duly authorized to transact business in Colorado, as Surety, are held and firmly bound unto the Obligee, in the sum of five per cent (5%) of the Principal's total bid price, lawful money of the United States for the payment of which sum, well and truly to be made to the Obligee, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

FURTHER THAT, a condition of the obligation that the Principal shall maintain his Proposal in full force and effect for thirty (30) days after the opening of the proposals for the project, or, if the Principal's Proposal is accepted, the Principal shall, within the prescribed time, execute the required Agreement, furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy, Certificates of Insurance and Certification and Affidavit Regarding Illegal Aliens, then this obligation shall be null and void, otherwise it shall remain in full force and effect, and subject to forfeiture upon demand as Liquidated Damages.

IN WITNESS WHEREOF said Principal and Surety have executed this Bond, this _____ day of _____, A.D., 20_____.

(Corporate Seal)

ATTEST

_____
Secretary

_____
Name (Print)

THE PRINCIPAL

_____
Company Name

_____
Address (including city, state and zip)
Phone number: _____

_____
Signature

_____
Name (Print) and Title

SIGNATURES If the "Principal" is doing business as a Corporation, the Bid Bond shall be signed by an officer, i.e., President or Vice President. The signature of the officer shall be attested to by the Secretary and properly sealed.

If the "Principal" is an individual or a partnership, the Bid Bond shall so indicate and be properly signed.

(Corporate Seal)

_____
Secretary

THE SURETY

_____

By _____
Attorney-in-Fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED. FAILURE TO PROVIDE A PROPERLY EXECUTED BID BOND WITH A PROPERLY EXECUTED POWER OF ATTORNEY WILL RESULT IN THE BIDDER'S PROPOSAL BEING DEEMED NON-RESPONSIVE.

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF AWARD

Date of Notice: _____
Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado Denver

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

TO:

The State of Colorado, represented by the undersigned, has considered the Proposals submitted for the above described work.

Your Proposal, deemed to be in the best interest of the State of Colorado, in the amount of _____ DOLLARS AND NO/100* ($_____*) is hereby accepted, pending final execution of the Agreement.

You **are** required to execute the approved Agreement and to furnish the Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance within ten (10) days from the date of this Notice.

If you fail to execute said Agreement and to furnish said Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance, and Certification and Affidavit Regarding Unauthorized Immigrants within ten (10) days from the date of this Notice, the State Controller is entitled to retain the amount of the Proposal Guaranty submitted with your Proposal as Liquidated Damages. In this event, the right is reserved to consider all of your rights arising out of the acceptance of your Proposal as abandoned and to award the work covered by your Proposal to another, or to re-advertise the Project, or otherwise dispose thereof.

By _____ By _____

State Buildings Programs (of Authorized Delegate) — Date

Principal Representative (Institution or Agency) — Date

When completely executed, this form is to be sent by **certified mail** to the Contractor by the Principal Representative or delivered by any other means to which the parties agree.

University of Colorado
Denver | Anschutz Medical Campus

SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS AND MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT

Institution/Agency: University of Colorado Denver / GFE

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

TO BE ELIGIBLE FOR AWARD OF THIS CONTRACT, EACH CONTRACTOR (INCLUDING ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR) IS REQUESTED TO COMPLY WITH THESE REQUIREMENTS.

I. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies that the (company) (joint venture) (is) (is not)* a service-disabled veteran-owned enterprise as defined in this report. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies that the (company) (joint venture) (is) (is not)* a minority enterprise as defined in this report. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies the (company) (joint venture) (is) (is not)* a woman-owned business enterprise as defined. (*Strike out where inapplicable.)

*Persons signing hereby swear and affirm that they are authorized to act on Architect/Engineer/Consultant/Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted**

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR

_____
Legal Name of Contracting Entity

_____
*Signature

By: _____
Name (print) Title

Date: _____

II. It is the general policy of the State of Colorado to be as inclusive as possible to all member communities when spending taxpayer dollars. It is also the intent of the State to address the goals of the HB14-1224 | CRS 24-103-211 of at least 3% of all contracts by dollar value to be awarded to SDVOSBs.

III. REQUIREMENTS

A. Service-Disabled Veteran-Enterprise (SDVE) means for the purpose of this report, a business who must be incorporated or organized in Colorado or they must maintain a place of business or have an office in Colorado and who are officially registered and verified as a SDVOSB by the Center for Veteran Enterprise within the U.S. Department of Veterans Affairs (www.vip.vetbiz.gov) per CRS 24-103-211

B. Minority Business Enterprise (MBE) means, for the purpose of this report, a business enterprise at least 51 percent that is owned and controlled by minority group members, or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned and controlled by minority group members. Eligible persons are expected to be engaged full time in the day-to-day operation and management of the business. Minority group members are ethnic minorities including African American, Hispanic American, Native American or Asian/Pacific American.

C. Women Business Enterprise (WBE) means, for the purpose of this report, a business enterprise of at least 51 percent of which is owned and controlled by a woman or women, or, in the case of a publicly-owned business, at least 51 percent of the stock of which is owned and controlled by women. Women are expected to be engaged full time in the day-to-day operation and management of the business.

D. The University of Colorado Denver does not have a certification process for nor does it require MBE's and WBE's to be certified.

E. The percentages of service-disabled veteran, minority and women-owned business participation will be determined by dollar value of the work subcontracted to or joint ventured with service-disabled veteran, minority, and women-owned firms, as compared to the total dollar value of the bid amount for all work bid under this contract.

F. Prior to the award of this contract, the contractor will be required to provide to the Principal Representative a list of SDV/M/WBE enterprises, stipulating the dollar amount of each subcontract or supplier of materials on page 2 of this Service-Disabled Veteran, Minority and Women Business Enterprises Participation Report.

G. The contractor will retain records and documents showing the level of participation for two years following completion of this contract. These records and documents, or copies thereof, will be made available at reasonable times and places for inspection by an authorized representative of the Principal Representative, or its designated representatives, and will be submitted to such representatives upon written request.

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR:

SDVOE: Yes ☐ No ☐ MBE: Yes ☐ No ☐ WBE: Yes ☐ No ☐

Total Contract Amount: $ _____

Name and Address of SDV/M/WBE Subcontractors and/or Suppliers and/or Self-Performed Work by SDV/M/WBE Primes*	**SDVE Contract Amounts**	**MBE Contract Amounts**	**WBE Contract Amounts**	**Type of Work**

*Indicate ethnicity based on Paragraph III. A. above.

Total SDVE Contracts $ _____

Total MBE Contracts: $ _____

Total WBE Contracts: $ _____

Total SDVE % _____

Total MBE %: _____

Total WBE %: _____

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CERTIFICATION AND AFFIDAVIT REGARDING UNAUTHORIZED IMMIGRANTS

Institution/Agency: **University of Colorado Denver**
Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

A. CERTIFICATION STATEMENT CRS 8-17.5-101 & 102 (HB 06-1343, SB 08-193)

The Vendor, whose name and signature appear below, certifies and agrees as follows:

1. The Vendor shall comply with the provisions of CRS 8-17.5-101 et seq. The Vendor shall not knowingly employ or contract with an unauthorized immigrant to perform work for the State or enter into a contract with a subcontractor that knowingly employs or contracts with an unauthorized immigrant.

2. The Vendor certifies that it does not now knowing employ or contract with and unauthorized immigrant who will perform work under this contract, and that it will participate in either (i) the "E-Verify Program", jointly administered by the United States Department of Homeland Security and the Social Security Administration, or (ii) the "Department Program" administered by the Colorado Department of Labor and Employment in order to confirm the employment eligibility of all employees who are newly hired to perform work under this contract.

3. The Vendor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and Employment. If the Vendor fails to comply with any requirement of this provision or CRS 8-17.5-101 et seq., the State may terminate work for breach and the Vendor shall be liable for damages to the State.

B. AFFIDAVIT CRS 24-76.5-101 (HB 06S-1023)

4. If the Vendor is a sole proprietor, the undersigned hereby swears or affirms under penalty of perjury under the laws of the State of Colorado that (check one):

   ☐ I am a United States citizen, or

   ☐ I am a Permanent Resident of the United States, or

   ☐ I am lawfully present in the United States pursuant to Federal law.

   I understand that this sworn statement is required by law because I am a sole proprietor entering into a contract to perform work for the State of Colorado. I understand that state law requires me to provide proof that I am lawfully present in the United States prior to starting work for the State. I further acknowledge that I will comply with the requirements of CRS 24-76.5-101 et seq. and will produce the required form of identification prior to starting work. I acknowledge that making a false, fictitious, or fraudulent statement or representation in this sworn affidavit is punishable under the criminal laws of Colorado as perjury in the second degree under CRS 18-8-503 and it shall constitute a separate criminal offense each time a public benefit is fraudulently received.

CERTIFIED and AGREED to this _____ day of _____, _20__.

VENDOR:

_____
Vendor Full Legal Name

BY: _____ _____
Signature of Authorized Representative Title

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

PERFORMANCE BOND

Institution/Agency: **University of Colorado Denver**
Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

BONDING COMPANY: DO NOT MAKE ANY CHANGES TO THE LANGUAGE IN THIS BOND.

KNOW ALL PERSONS BY THESE PRESENTS:

That the Contractor

as Principal and hereinafter called "Principal,"

and

as Surety and hereinafter called "Surety," a corporation organized and existing under the laws of _ _____ are held and firmly bound unto **the STATE OF COLORADO** acting by and through the Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver
(AGENCY OR INSTITUTION)

hereinafter called the "Principal Representative", in the sum of _____ _____ Dollars ($_____)

for the payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly, by these presents.

WHEREAS, the Principal and the State of Colorado acting by and through the Principal Representative have entered into a certain Contract, hereinafter called "Contract," dated _____, 20 _____, for the construction of a PROJECT described as

which Contract is hereby by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION, is such that, if the Principal shall promptly, fully and faithfully perform all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term of said Contract any extensions thereof that may be granted by the Principal Representative with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

AND THE SAID SURETY, for value received hereby stipulates and agrees that whenever the Principal shall be, and declared by the Principal Representative to be in default under said Contract, the State of Colorado having performed its obligations thereunder, the Surety may promptly remedy the default or shall promptly (1) Complete the Contract in accordance with its terms and conditions, or (2) Obtain a bid or bids for submittal to the Principal Representative for completing the Contract in accordance with its terms and conditions, and upon determination by the Principal Representative and Surety of the lowest responsible bidder, arrange for a contract between such bidder and the State of Colorado acting by and through the Principal Representative and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion, less the balance of the contract price but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount hereinbefore set forth. The term "balance of the contract price" as herein used shall mean the total amount payable to the Principal under the Contract and any amendments thereto, less the amount properly paid by the State of Colorado to the Contractor.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the State of Colorado.

IN WITNESS WHEREOF said Principal and Surety have executed this Bond, this _____ day of , A.D., _____ 20____.

(Corporate Seal)

THE PRINCIPAL

_____

ATTEST:

By: _____

Title: _____

_____
Secretary

(Corporate Seal)

SURETY

_____

By: _____
Attorney-in-fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful payment for all labor and material of the contract.

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

LABOR AND MATERIAL BOND

Institution/Agency: University of Colorado Denver
Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

BONDING COMPANY: DO NOT MAKE ANY CHANGES TO THE LANGUAGE IN THIS BOND.

KNOW ALL PERSONS BY THESE PRESENTS:

That the Contractor

as Principal and hereinafter called "Principal,"

and

as Surety and hereinafter called "Surety," a corporation organized and existing under the laws of _____ are held and firmly bound unto the STATE OF COLORADO acting by and through the Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver
(agency or institution)

hereinafter called "Principal Representative," and to all subcontractors and any others who have supplied or furnished or shall supply or furnish materials, rental machinery, tools, or equipment actually used in the performance of the hereinafter identified Contract, or who have performed or shall perform labor in the performance of or in connection with said Contract, hereinafter called "Obligees" in the sum of _____ _____ Dollars ($_____)

together with interest at the rate of eight per cent (8%) per annum on all payments becoming due in accordance with said Contract, from the time such payments shall become due until such payment shall be made, for the payment of which, well and truly made to the Obligees, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly, by these presents.

WHEREAS, the Principal and the State of Colorado acting by and through the Principal Representative have entered into a certain Contract, hereinafter called "Contract," dated _____, 20___ for the construction of a PROJECT described as

which Contract is hereby by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal and the Surety shall fully indemnify and save harmless the State of Colorado and the Principal Representative from and against any and all costs and damages, including patent infringements, which either may suffer by reason of any failure or failures of the Principal promptly and faithfully to perform all terms and conditions of said Contract and shall fully reimburse and repay the State of Colorado and the Principal Representative all outlay and expense which the State of Colorado and the Principal Representative may incur in making good any such failure or failures, and further, if the Principal and his subcontractors shall duly and promptly pay for any and all labor, materials, team hire, sustenance, provisions, provender, rental machinery, tools, or equipment and other supplies which have been or shall be used or consumed by said Principal or his subcontractors in the performance of the work of said Contract , and it said Principal shall duly and promptly pay all his subcontractors the sums due them for any and all materials, rental machinery, tools, or equipment and labor that have been or shall be furnished, supplied, performed or used in connection with performance of said Contract, and shall also fully indemnify and save harmless the State of Colorado and the Principal Representative to the extent of any and all expenditures which either or both of them may be required to make by reason of any failures or defaults by the Principal or any subcontractor in connection with such payments; then this obligation shall be null and void, otherwise it shall remain in full force and effect.

It is expressly understood and agreed that any alterations which may be made in the terms of said Contract or in the work to be done under said Contract, or any extension(s) of time for the performance of the Contract, or any forebearance on the part of either the State of Colorado or the Principal to any of the others, shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety of any such alteration, extension or forbearance being hereby waived.

IN WITNESS WHEREOF, the Principal and the Surety have executed this Bond, this _____ day of _____, A.D., 20_____.

(Corporate Seal)

THE PRINCIPAL

_____

ATTEST:

By: _____

Title: _____

_____
Secretary

(Corporate Seal)

SURETY

_____

By: _____
Attorney-in-fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful performance of the contract.

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Name of Insurance Broker / Agent	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
Street Address	PRODUCER CUSTOMER ID #:	
City ST ZIP	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A : Name of Insurance Company	
Named Insured Contractor, Standing Order Contractor	INSURER B : Name of Insurance Company	
(SC-6.21, SC-6.23, SC6.4), Design/Build Entity	INSURER C : Name of Insurance Company	
Street Address (SC-8.0)	INSURER D : Name of Insurance Company	
City ST ZIP	INSURER E : Name of Insurance Company	
	INSURER F : Name of Insurance Company	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY							
	[X] COMMERCIAL GENERAL LIABILITY	X	X	POLICY #	MM/DD/YY	MM/DD/YY	EACH OCCURRENCE	$ 1,000,000
	[ ] CLAIMS-MADE [X] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$ 2,000,000
	[ ] POLICY [X] PRO-JECT [ ] LOC							$
B	AUTOMOBILE LIABILITY							
	[ ] ANY AUTO			POLICY #	MM/DD/YY	MM/DD/YY	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	[X] ALL OWNED AUTOS						BODILY INJURY (Per person)	$
	[ ] SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	[X] HIRED AUTOS						PROPERTY DAMAGE (Per accident)	$
	[X] NON-OWNED AUTOS							$
								$
C	[X] UMBRELLA LIAB [ ] OCCUR			POLICY #	MM/DD/YY	MM/DD/YY	EACH OCCURRENCE	$ 5,000,000
	[X] EXCESS LIAB [ ] CLAIMS-MADE						AGGREGATE	$ 5,000,000
	[ ] DEDUCTIBLE							$
	[ ] RETENTION $							$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			POLICY #	MM/DD/YY	MM/DD/YY	[X] WC STATU-TORY LIMITS [ ] OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N [ ]	N / A					E.L. EACH ACCIDENT	$ 100,000
	(Mandatory in NH) If yes, describe under SPECIAL PROVISIONS below						E.L. DISEASE - EA EMPLOYEE	$ 100,000
							E.L. DISEASE - POLICY LIMIT	$ 500,000
E	PROFESSIONAL LIABILITY			POLICY #	MM/DD/YY	MM/DD/YY	Limit / Aggregate	$2,000,000 / $2,000,000
	POLLUTION LIABILITY			POLICY #			Limit / Aggregate	$2,000,000 / $2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

The Regents of the University of Colorado, a Body Corporate, are named Additional Insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Contractor, including completed operations regarding Project # _____. The Professional Liability policy is endorsed to provide a waiver of subrogation against The Regents of the University of Colorado, a Body Corporate. Endt CA9948 & MCS-90 for hazardous transport.

CERTIFICATE HOLDER

The Regents of the University of Colorado, a Body Corporate
Project Manager:
1945 N. Wheeling Street
Campus Mail Stop F-418
Aurora, CO 80045

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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ACORD®

CERTIFICATE OF PROPERTY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

If this certificate is being prepared for a party who has an insurable interest in the property, do not use this form. Use ACORD 27 or ACORD 28.

PRODUCER	CONTACT NAME:	
Name of Insurance Broker / Agent	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
Street Address	PRODUCER CUSTOMER ID #:	
City ST ZIP	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A : Name of Insurance Company	
Named Insured: Contractor, Standing Order Contractor	INSURER B :	
(SC-6.21, SC-6.23, SC-6.4), Design/Build Entity (SC-8.0)	INSURER C :	
Street Address	INSURER D :	
City ST ZIP	INSURER E :	
	INSURER F :	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

LOCATION OF PREMISES / DESCRIPTION OF PROPERTY (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project # _____ and Project Title: _____

Location Address _____

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	COVERED PROPERTY	LIMITS
	☐ PROPERTY CAUSES OF LOSS / DEDUCTIBLES ☐ BASIC / BUILDING ☐ BROAD / CONTENTS ☐ SPECIAL ☐ EARTHQUAKE ☐ WIND ☐ FLOOD				☐ BUILDING ☐ PERSONAL PROPERTY ☐ BUSINESS INCOME ☐ EXTRA EXPENSE ☐ RENTAL VALUE ☐ BLANKET BUILDING ☐ BLANKET PERS PROP ☐ BLANKET BLDG & PP	$ $ $ $ $ $ $ $ $ $
A	☒ INLAND MARINE CAUSES OF LOSS ☐ NAMED PERILS ☒ Special Form	TYPE OF POLICY Builder's Risk POLICY NUMBER POLICY #	MM/DD/YY	MM/DD/YY	☒ Completed Value ☒ Deductible ☒ Flood/Earthquake ☒ Off-Prem Storage	$ Show Limit $ Show Deductible $ Show Limit $ Show Limit
	☐ CRIME TYPE OF POLICY					$ $ $
	☐ BOILER & MACHINERY / EQUIPMENT BREAKDOWN					$ $
						$ $

SPECIAL CONDITIONS / OTHER COVERAGES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

The Regents of the University of Colorado, a Body Corporate, are named as Additional Named Insured.

See Attached for Additional Provisions as required in contract

CERTIFICATE HOLDER

The Regents of the University of Colorado, a Body Corporate
Project Manager:
1945 N. Wheeling Street
Campus Mail Stop F-418
Aurora, CO 80045

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE TO PROCEED (DESIGN/BID/BUILD CONTRACT)

Date of Notice: _____
Date to be inserted by the Principal Representative

Date/Description of Contract Documents: _____

Institution/Agency: University of Colorado Denver

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

Attach Notice of Code Compliance from Code Review Agent/Building Official for Documents Listed Above

To:

This is to advise you that your Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance, and Affidavit Regarding Unauthorized Immigrants have been received. Our issuance of this Notice does not relieve you of responsibility to assure that the bond and insurance requirements of the Contract Documents are met for the duration of the Agreement. The Agreement dated _____ covering the above described work has been fully executed.

You are hereby authorized and directed to proceed within ten (10) days from date of this Notice as required in the Agreement. Any liquidated damages for failure to achieve Substantial Completion by the date agreed that may be applicable to this Contract will be calculated using the date of this Notice for the date of the commencement of the Work.

The completion date of the Project is _____ (M/D/YYYY).

By _____
State Buildings Programs (or Authorized Delegate) — Date

By _____
Principal Representative (Institution or Agency) — Date

When completely executed, this form is to be sent by <u>certified mail</u> to the Contractor by the Principal Representative; or by any other means to which the parties agree.

University of Colorado Denver **Request for Information from No.(start at 1 and go up)**

RFI Title:	**Date:**
Project: Perinatal Replace Chiller 2	**Project #** 20-115536
To: Architect/Engineer and UCD Project Manager	**From: Contractor name and address**
Phone:	**Phone:**
Fax:	**Fax:**
Email(s)	**Email(s)**

Description of Request and Proposed Solution:	
Contractor Suspects Schedule Impact (Y/N)	**Contractor Suspects Cost Impact (Y/N)**
Signature:	**Company:**
Print Name:	**Date:**

A/E Suspects Schedule Impact (Y/N)	**A/E Suspects Cost Impact (Y/N)**
Signature:	**Company:**
Print Name:	**Date:**

Distribute to A/E, Contractor and UCD PM when completed

UNIVERSITY OF COLORADO DENVER REQUEST FOR INFORMATION LOG

PROJECT # and TITLE: 20-115536 / Perinatal Replace Chiller 2

RFI #	SPEC SECTION / DETAIL / SHEET #	DESCRIPTION	DATE TO A/E	DAYS OUT	A/E return date	Change order Bullentin #	Contractor change #

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER BULLETIN

Change Order Bulletin No: _____ Date _____

Contractor: _____

Institution or Agency: University of Colorado

Project No./Name: 20-115536 / Perinatal Replace Chiller 2

Description of Work: _____

This bulletin is issued to define the scope of revision in drawings and/or specifications for a contemplated change order. The work called for by these revisions shall be in accordance with the requirements of the original contract documents.

Please prepare and submit a proposal for the changes described below. For pricing use State Form SC-6.312. A formal change order State Form SC-6.31 will be issued after approval of your proposal by the Principal Representative and the Architect. Your proposal shall include a statement as to the effect this change will have on the time for completion of the project.

This bulletin is **NOT** an authorization to proceed.

DESCRIPTION OF CHANGE:

SPECIFICATION REVISIONS:

STATUS OF EXISTING WORK:

PREPARED BY: _____
ARCHITECT/ENGINEER OR CONTRACTOR

APPROVED BY: _____
PRINCIPAL REPRESENTATIVE
(INSTITUTION or AGENCY)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER PROPOSAL

(enter information ONLY in YELLOWED cells)

Change Order Proposal No. _____ Date _____

Change Order Bulletin No: _____

Description of Work: (enter into text box) Date _____

Contractor
University of Colorado Denver

Institution or Agency
20-115536 / Perinatal Replace Chiller 2

Project No./Name

(Before completing this form, read instructions on reverse side.)

PART I -	**WORK PERFORMED BY CONTRACTOR**					
Line 1.	Direct Labor Costs		$			
Line 2.	Labor Overhead (Direct Labor Burdens)	(x Line 1)	$	0.00		
Line 3.	Total Contractor's Labor Costs (Lines 1 and 2)				$	0.00
Line 4.	Direct Materials Costs		$			
Line 5.	Materials Overhead (Delivery Costs & Taxes)	(x Line 4)	$	0.00		
Line 6.	Total Materials Costs (Lines 4 and 5)				$	0.00
Line 7.	Total Equipment Costs				$	
Line 8.	PART I - TOTAL CONTRACTOR'S L, M & E COSTS (Lines 3, 6 and 7)				**Part I** $	0.00
PART II -	**WORK PERFORMED BY SUBCONTRACTOR**					
Line 9.	Direct Labor Costs		$			
Line 10.	Labor Overhead (Direct Labor Burdens)	(x Line 9)	$	0.00		
Line 11.	Total Subcontractor's Labor Costs (Lines 9 and 10)				$	0.00
Line 12.	Direct Materials Costs					
Line 13.	Materials Overhead (Delivery Costs & Taxes)	(x Line 12)	$	0.00		
Line 14.	Total Subcontractor's Materials Costs (Lines 12 and 13)				$	0.00
Line 15.	Total Subcontractor's Equipment Costs				$	
Line 16.	Total Subcontractor's L, M & E Costs (Line 11, 14 and 15)				$	0.00
Line 17.	Subcontractor's Overhead (Indirect Costs)	(10.0% x Line 16)	$	0.00		
Line 18.	Subcontractor's Profit (on line 16)	Addition or Deduct	$	0.00		
Line 19.	PART II - TOTAL SUBCONTRACTOR'S COSTS (Lines 16, 17 and 18)				**Part II** $	0.00
PART III -	**CONTRACTOR'S OVERHEAD & PROFIT**					
Line 20.	Contractor's Overhead (Indirect Costs)	(10.0% x Part I Total)	$	0.00		
Line 21.	Contractor's Profit	(5.0% x Part I Total)	$	0.00		
Line 22.	PART III - TOTAL CONTRACTOR OVERHEAD & PROFIT (Lines 20 and 21)				**Part III** $	0.00
PART IV -	**CONTRACTOR'S MARKUP ON SUBCONTRACTOR**					
Line 23.	Contractor's Commission on Subcontractor	(5.0% x Part II Total)	$	0.00		
Line 24.	Contractor's Profit (on Line 19)	Addition or Deduct	$	0.00		
Line 25.	PART IV - TOTAL CONTRACTOR MARKUP ON SUBCONTRACTOR (Lines 23 and 24)				**Part IV** $	0.00
PART V -	**SUBTOTAL C.O. PROPOSAL (Parts I and II and III and IV)**				Part V (Subtotal $	0.00
PART VI -	**CONTRACTOR'S BOND COST**	(x Part V Total)			Part VI $	0.00
PART VII -	**GRAND TOTAL CHANGE ORDER PROPOSAL (Sum of Totals: Parts V and VI)**				**Grand Total** $	**0.00**
PART VIII -	**CONTRACT TIME (CALENDAR DAYS CHANGED)**	EXTENDED	NO CHANGE	REDUCED		Days

THE TIME OF COMPLETION MAY CHANGE BY THE CALENDAR DAYS INDICATED (ABOVE) FROM THE TOTAL NUMBER OF DAYS LISTED IN THE CONTRACTOR'S AGREEMENT TO COMPLETE THE ENTIRE PROJECT.

CONTRACTOR'S CERTIFICATE:
This is to certify that, to the best of my knowledge and belief, the cost/price data submitted in response to the listed C.O. Bulletin, are accurate, complete and current as of _____.

Firm: _____

Name & title: _____

Signature: _____

*Date: _____

ARCHITECT/ENGINEER'S CERTIFICATE:
This is to certify that I have analyzed the proposal and find, to the best of my knowledge and belief, that the proposal represents current, fair, factual and competitive cost/price data.

Firm: _____

Name & title: _____

Signature: _____

Date: _____

* The proposal shall remain in full force and effect for a period of _____ calendar days from date of signature.

STATE BUILDINGS PROGRAMS (or Authorized Delegate)

_____ Date: _____

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER

Change Order No: _____ Contract ID No. _____ Date _____

Contractor: _____

Institution or Agency: University of Colorado Denver

Project No./Name: 20-115536 / Perinatal Replace Chiller 2

Your Change Order Proposal(s), dated _____ is hereby being designated for approval of the following work:

(Note: If more space is needed for description of work, attach additional 8-1/2" x 11" sheets hereto.)

This change order was originated by the Contractor ☐, Architect/Engineer ☐, State ☐, and I/We do hereby recommend acceptance and approval of the change to the Contractor's Agreement Dated _____ which is by this reference, made a part hereof, and identified as Exhibit _____ with an increase ☐, a decrease ☐, no change ☐, of $_____.

The Time of Completion is extended _____ calendar days ☐, is unchanged ☐, is reduced ☐ calendar days, from the total number of days listed in the Contractor's Agreement to complete the entire Project. The revised total number of days to complete the entire Project aggregating this Change Order and previously approved Change Order(s) per the Summary of Changes chart below, is _____ calendar days. If the completion date was extended or reduced, the new completion date of the Project is _____ (M/D/YYYY).

SUMMARY OF CHANGES			
	Description of Work/Date	Time of Completion/ Calendar Days Extended/Reduced	Dollar Amounts
Original Contract			
Change Order #1			
Change Order #2			
Current Totals			

*Persons signing for Architect/Engineer/Contractor hereby swear and affirm that they are authorized to act on Architect/Engineer/Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted.**

Architect/Engineer Firm	Name and Title (print)	Date
	Signature	
Contractor (Name of Firm)	Name and Title (print)	Date
	Signature	
Institution or Agency	Name and Title (print) Principal Representative (Signature)	Date

CONTRACT STATUS

Original Contract Value _____

Previous increases by CO/Amend _____

Previous decreases by CO/Amend _____

Value After Prior CO's/Amend _____

This CO/Amend

Increases ☐ Decreases ☐ _____

CURRENT CONTRACT VALUE _____

STATE BUILDINGS PROGRAMS (or Authorized Delegate) _____ DATE _____

STATE CONTROLLER (or Authorized Delegate) _____ DATE _____

(Verification)

STATE BUILDINGS AND REAL ESTATE PROGRAMS
CHANGE ORDER MANAGEMENT
CHANGE ORDER LOG

Project #: **20-115536**
Project Title: **Perinatal Replace Chiller 2**
Contractor:

CO	COP	COB	INITIATION DATE	INITIATOR			DESCRIPTION	VALUE ADDED	CONT CODE	IMPACT		STATUS	REASON FOR CHANGE	RESOLUTION / COMMENT
				O	A	C				COST	TIME			

TOTALS: COST: ± **0.00**
TIME: ± **0**

~~Contingency Codes:~~

DSC - DIFFERING SITE CONDITIONS: Either encountered on site or in the building structure due to existing conditions not identified or detected during initial investigations.

BA - BID ALTERNATES: Implementation of either additive or deductive bid alternates due to favorable/unfavorable base bid results. The functionality of the project is not compromised by implementation of deductive alternates.

AV - ADDED VALUE: Change work represents essential work necessary to achieve original scope of work but was not identified in the original bid documents due to omission.

UPG - UPGRADES: Change work due to voluntary upgrading by agency/institution of materials and/or equipment/systems within original scope of work. Justification is to be based on durability, energy efficiency, aesthetics, etc.

UI - UNKNOWN ITEMS: Unforeseen costs associated with impact of project on existing functions of the agency/institution causing disruptions, shut downs, relocations, etc.

~~Status Codes~~

OPN - Open item

SUB - COP has been submitted by Contractor for review by A/E and Owner

APP - Approved for processing

CLO - Closed item (CO has been processed or item voided

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

DATE:

CERTIFICATE FOR CONTRACTOR'S PAYMENT

PAY APPLICATION #: FROM: TO: P.O. NO:
CONTRACTOR:
AGENCY/INSTITUTION: University of Colorado Denver
PROJECT #/TITLE: 20-115536 / Perinatal Replace Chiller 2

AMENDMENTS/CHANGE ORDER SUMMARY		Deductions (L)	Additions (M)
Prior amendments / Change Orders CO#'s:			
	Total		
Approved This Period			
Number	Date		
Total Approved this Period		$0.00	$0.00
	Totals	$0.00	$0.00
		$0.00	$0.00
Net change by Amendments / Change Orders (L + M)			$0.00

Application is made for Progress for work completed and in place and stored on site on the above Project. As indicated on the following page(s).

ORIGINAL CONTRACT SUM (K/E)	$0.00
NET CHANGE FROM AMENDMENTS/CHANGE ORDERS (L + M/E)	$0.00
PRESENT CONTRACT TOTAL (N/E)	$0.00

Current to Date Total Amount Earned (Due to Date (I))	Retainage	Current to Date Payment Less Retainage
$0.00		$0.00
Prior Payments Total Amount Earned	Retainage	Prior Payments Less Retainage
		$0.00
This Payment Total Amount Earned	Retainage	This Payment Less Retainage
		$0.00
		Warrant Amount

INSTITUTION/AGENCY (or Authorized Delegate) Date

STATE BUILDINGS PROGRAMS (or Authorized Delegate) Date

Contractor certifies that all work and materials included in this estimate complies with the terms and conditions of the conditions construction contract and authorized changes thereto.

CONTRACTOR Date

ARCHITECTS/ENGINEER'S CERTIFICATION

In accordance with the Contract and this Application for Payment, the above Contractor is entitled to a payment of: **$0.00**

ARCHITECT/ENGINEER Date

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

DATE: _____

CONTRACTOR'S APPLICATION FOR PAYMENT

Detail of Schedule of Values					Totals of Work Completed and Stored to Date				
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Item No.	Description of Work	Material	Labor and Other	Totals (C + D)	Materials On-Site But Not In Place	WORK IN PLACE Material	WORK IN PLACE Labor and Other	Total Amount Due to Date (F+G+H)	% Complete and in Place (I / E)
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
				$0.00				$0.00	#DIV/0!
(K)	ORIGINAL CONTRACT TOTALS (SUM)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#DIV/0!
(L)	AMENDMENTS/CHANGE ORDER DEDUCTIONS			$0.00				$0.00	#DIV/0!
(M)	AMENDMENTS/CHANGE ORDER ADDITIONS			$0.00				$0.00	#DIV/0!
(N)	PRESENT CONTRACT TOTALS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	**$0.00**	#DIV/0!

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF SUBSTANTIAL COMPLETION

Date of Substantial Completion: _____
Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado Denver

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

TO:

Principal Representative

and

Contractor

This is to advise you that the Work has been reviewed, inspected and determined, to the best knowledge, information and belief of the Architect/Engineer, to be substantially complete as of the date noted above in accordance with the criteria outlined in Article 41 of The General Conditions of the Contract in SC-6.23 and SC-8.1 or Article 17.3 in SC-6.4 and the Specifications, including without limitation a) suitable for occupancy, b) inspected for code compliance with Building Inspection Records signed by code officials for the State, c) determined to be fully and comfortably usable, and d) fully cleaned and appropriate for presentation to the public.

A punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work is attached hereto, along with the Contractor's schedule for the completion of each and every item identified on the punch list specifying the Subcontractor or trade responsible for the work, and the dates the completion or correction will be commenced and finished within any period indicated in the Agreement for punch list completion prior to Final Acceptance.

Except as stated on the reverse side of this Notice of Substantial Completion, all manufacturers' warranties, other special warranties and the Contractor's one-year obligation to perform remedial work, shall commence on the Date of Substantial Completion noted above.

This Notice of Substantial Completion shall be effective and establish the Date of Substantial Completion only when fully executed by the Contractor and the Principal Representative. The Principal Representative accepts the Work as substantially complete as of the Date of Substantial Completion herein noted. The Contractor agrees to complete or correct the Work identified on the attached punch list and to do so in accordance with attached punch list completion schedule

Architect/Engineer	Date	Contractor	Date
State Buildings Programs (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

The responsibilities of the Principal Representative and the Contractor for security, maintenance, heat, utilities, and insurance shall be as specified in the Contract Documents or as otherwise hereafter noted:

Exceptions, if any, to the commencement of warranties shall be:

The attached final punch list consists of _____ pages, and the attached Contractor's schedule showing the dates of commencement and completion of each punch list item consists of _____ pages.

When completely executed, this form shall be sent to the Contractor and the Principal Representative with a copy to State Buildings Programs.

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF APPROVAL OF OCCUPANCY/USE

Date of Occupancy: _____
Date to be inserted by the Architect/Engineer after consulation with Principal Representative

Institution/Agency: University of Colorado Denver

Project No./Name: 20-115536 / Perinatal Replace Chiller 2

Portion(s) of project for which occupancy is approved:

Type of Occupancy: ☐ Total or ☐ Partial

The items identified below if applicable must be completed with before Occupancy is approved.

Date Completed	A/E Signoff	
		1. The Notice of Substantial Completion has been issued and the Building Inspection Record is completely signed-off and attached.
		2a. Notification has been made to the local Fire Department concerning which portion(s) of the building will be occupied and the date(s).
		2b. Fire alarms, smoke detection systems and building fire sprinkler systems have been fully checked and are operable.
		2c. The building's fire connections must be installed and operable, if applicable.
		3. Coordination for final utility and service connections and meters (water, gas, sewer, electricity and telecommunication) has been made and systems are in full operating order.
		4. Sterilization of plumbing systems has been performed.
		5. Operational test of systems and equipment has been performed as required.
		6. Systems adjustments such as balancing, equipment operations, etc., have been performed. Reports have been submitted to the Architect/Engineer for approval.
		7. Principal Representative furnished equipment and furnishings are coordinated and placed.
		8. All elements left unfinished must be in such condition that there would be no hazard to the health or safety of the occupants.

		9. All restroom facilities must be fully functional and operable.
		10. All light fixtures must be installed and operable.
		11. All exit lights and emergency lighting systems have been checked and are operable.
		12. All windows have been glazed and hardware is available for ventilation purposes.
		13. All routes of egress must be clear of construction materials and debris at all times.
		14. There must be a means of pedestrian access to each building. Contractor must have sidewalks installed before occupancy and pedestrian barricades and other means of public protection as required.

Occupancy does not constitute acceptance of the project as being complete. It simply provides the Principal Representative the opportunity to occupy/use the project or the applicable portion thereof prior to final completion and acceptance. Occupants can expect to be impacted by the Contractor's efforts to complete the project. The Contractor would not repair any damage caused by the occupants.

Architect/Engineer	Date	Principal Representative (Institution or Agency)	Date
State Buildings Programs (or Authorized Delegate)	Date	Contractor	Date

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Notice of Occupancy and Use List

Project Name & Number: 20-115536 / Perinatal Replace Chiller 2

Contractor: _____

In addition to completing Notice of Approval of Occupancy / Use (SBP-01), the following items must be completed before Occupancy is approved.

Activity	Date Completed	Remarks
1. Final and formal address posted on the building entries.		
2. A copy of the Contractor's in-progress red line "as-built" drawings has been given to BMO representative & a 2nd copy is provided for Projects plan room. This is to include landscape drawings showing irrigation installation.		
3. Maintenance, operations and spare parts manuals on all installed equipment.		
4. Notice of Partial Substantial Completion concerning roles/ responsibilities of University and Contractor for security, maintenance, heat, utilities reviewed and accepted.		
5. Manufacturer maintenance, operations and spare parts manuals for fixtures, mechanical, electrical and plumbing.		
6. Hardware-maintenance, operations and spare parts manuals for doors & locks, including roll up doors.		
7. Warranty Dates and Contact list for all Contractors and Suppliers given to BMO.		
8. Transfer utility account from Contractor to Facilities Operations.		
9. Site plan to include first floor main isolation locations and plans for each floor to include main utility shutoffs, for utilities to include water, electrical, steam, sewer, fuel supply, telecom, fiber optic and gasses, identified on a set of drawings.		
10. If Commissioning Report is completed, BMO has reviewed/ commented, including electrical, plumbing, mechanical/ HVAC.		
11. All Contractor provided equipment has new filters & construction filters removed.		
12. Not Used		
13. Elevator equipment rooms insulated and space conditioned for control system requirements.		
14. Testing Certifications provided to BMO for Elevators, Fire Systems & Annunciator Systems.		
15. FSS has been provided with copy of Building Department testing and inspection report for window washing equipment.		
16. Roof walking pads to access equipment are installed.		
17. PM to communicate to fire department via Life Safety Officer that building has transitioned to BMO. Alarms at Anschutz Medical Campus report to University Police Dispatch and at Downtown report to designated monitoring company.		

18. BAS System (Siemens), Energy and Lighting, Fuel Systems, and Power Management must report remotely & verify with University - Engineering.		
19. Training for BMO and FSS on installed equipment and systems is completed.		
20. Equipment keys and locks transitioned to Operations, including fire panels, electrical panels, directories and generator panels. Construction cores removed and replaced with permanent cores.		
21. Access control pathways and junction boxes for installed doors, gates, loading docks and roof access complete. ***All wiring and hardware completed and electronic security access controls in place and tested by University Electronic Security.**		
22. EH&S is provided, as applicable for project, with fume hood certification, water testing certification, hazardous waste compliance certification, radiation compliance certification, BSL3 certification, and all other specialty equipment certification.		
23. PM notifies University Risk Management that project is transferring to University and notifies Contractor that it can eliminate Builders Risk Insurance.		
24. Not Used		
25. Not Used		
26. Elevator tools, including hand tools, computer, proprietary and operational software is received and confirm 1-year service from date of acceptance.		
27. All computers and software required in drawings and specs. are received, including for BAS, Energy and Lighting, Fuel Systems, and Power Management, and any specialty software and alarm codes for operating systems.		
28. For all areas to be transferred to University, all waste and debris removed; floor and wall surfaces clean and in good repair; ceiling surfaces clean, unmarked, in place; site, including sidewalks, cleared of debris and construction equipment; and roof is clear of all materials and debris.		
29. Water chlorination and testing complete and provided by PM to Chief Building Official and BMO via BMO Rep.		
30. Toilet accessories are in place that meet custodial contract.		
31. Trash receptacles outside the building are in place		

University Project Manager (sign & print name) Date

University BMO Rep. (sign & print name) Date

University FSS Rep (sign & print name) Date

University Downtown Rep. (If Necessary) (sign & print name) Date

***Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.**

Mark N/A by item if it is not applicable to project

7.12.11

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

PRE-ACCEPTANCE CHECKLIST*

Institution or Agency: University of Colorado Final Punch List Date _____
Architect/Engineer: _____
Contractor: _____
Project No./Name: 20-115536 / Perinatal Replace Chiller 2

After Contractor is satisfied that work is complete as per Notice of Substantial Completion Punch List, a date for final review is established. Architect/Engineer inspection is made with Contractor(s) and Principal Representative and State Buildings Programs (SBP) present. Forms are processed as required.

	DATE COMPLETED	A/E SIGNOFF	REMARKS
1. The Notice of Approval of Occupancy/Use has been fully executed.			
2. Schedule for corrections, deficiencies, and items to be supplied are established by Contractor.			
3. Final Change Orders are processed (must be completed prior to Notice of Acceptance).			
4. The Principal Representative shall not authorize final payment until all items on the punch list have been completed and accepted and the Notice of Contractor's Settlement has been advertised and all claims resolved.			
5. Permanent keying, keys and keying instructions have been performed.			
6. Extra materials as per specifications are delivered to Principal Representative.			
7. As-built drawings have been submitted to Architect/Engineer.			
8. Guarantee/Warranty documentation requirements are met.			
9. Removal of Contractor's temporary work including cleanup and debris removal.			
10. State personnel are instructed in system and equipment operations as required by contract.			
11. All Instructions, manuals, guides, and charts have been transmitted to Principal Representative.			

Architect/Engineer Date

Contractor Date

State Buildings Programs (or Authorized Delegate) Date

Principal Representative (Institution or Agency) Date

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Building / Project Acceptance List

Project Name & Number: 20-115536 / Perinatal Replace Chiller 2

Contractor: _____

In addition to completing Pre-Acceptance Checklist (SBP-05), the following items must be completed before Final Acceptance.

Activity	Date Completed	Remarks
1. Review State Buildings Pre-Acceptance check list & Notice of Approval of Occupancy / use form with BMO rep & confirm agreement with status		
*2. Establish list of post construction change orders & track separately from basic project until items are complete – call it Phase 2 to avoid delay on basic project		
3. O & M Manuals given to BMO Representative and BMO Archivist (2 hard copies and 1 electronic total)		
*4. Record Documents – a hard copy of plans and specifications are provided for plan room & given to BMO & electronic auto cad & specs are given to Archive Officer (Art Steinman) this is to include landscape drawings showing irrigation installation.		
*5. Final Site Walk is completed with University Grounds Supervisor. Drain barriers are removed and storm drains cleared. MS4 storm water plan, CDPHE permits, and evidence of final closeout received by Project Manager and all copied to University Engineering Division.		
*/**6. **Move-related work items complete including physical move, tours (occupants & police), mail, phone & electrical hook ups for equipment & furniture systems complete & freezers enrolled in University freezer program.**		
7. 1) existing damaged landscape is repaired		
8. Attic stock, matches spec. requirements, is located in secured location, and is inventoried.		
9. Electrical system one line diagram framed and mounted in electrical room.		
10. Not Used		
11. Contractor keys issued by University BMO returned to University Key Shop via PM/ BMO Rep.		
12. Not Used		
13. Not Used		
14. Not Used		

15. Safety grating in pipe chases in place.		
16. Not Used		
17. All applicable reports, including Air Emission reports; Sewer Reports, including for process diverters, traps and collection tanks; Fuel Storage Tank and Detection reports; and Water System tests and reports provided to BMO via PM and BMO Rep.		
18. Not Used		
19. Not Used		
20. Not Used		
21. Not Used		
22. If commissioning is included for project, Commissioning Agent certification is received by BMO via PM and BMO Rep.		

University Project Manager Date
(sign & print name)

University BMO Rep. Date
(sign & print name)

University FSS Date
(sign & print name)

University Downtown Rep (if necessary) Date
(sign & print name)

*Warranty dates are not subject to completion of these items by contract
<u> Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.</u>**
Mark N/A by item if it is not applicable to project
7.12.11

University of Colorado
Denver | Anschutz Medical Campus

SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS AND MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT

Institution/Agency: University of Colorado Denver / GFE

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

TO BE ELIGIBLE FOR AWARD OF THIS CONTRACT, EACH CONTRACTOR (INCLUDING ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR) IS REQUESTED TO COMPLY WITH THESE REQUIREMENTS.

I. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies that the (company) (joint venture) (is) (is not)* a service-disabled veteran-owned enterprise as defined in this report. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies that the (company) (joint venture) (is) (is not)* a minority enterprise as defined in this report. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies the (company) (joint venture) (is) (is not)* a woman-owned business enterprise as defined. (*Strike out where inapplicable.)

*Persons signing hereby swear and affirm that they are authorized to act on Architect/Engineer/Consultant/Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted**

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR

_____
Legal Name of Contracting Entity

_____
*Signature

By: _____
Name (print) Title

Date: _____

II. It is the general policy of the State of Colorado to be as inclusive as possible to all member communities when spending taxpayer dollars. It is also the intent of the State to address the goals of the HB14-1224 | CRS 24-103-211 of at least 3% of all contracts by dollar value to be awarded to SDVOSBs.

III. REQUIREMENTS

A. Service-Disabled Veteran-Enterprise (SDVE) means for the purpose of this report, a business who must be incorporated or organized in Colorado or they must maintain a place of business or have an office in Colorado and who are officially registered and verified as a SDVOSB by the Center for Veteran Enterprise within the U.S. Department of Veterans Affairs (www.vip.vetbiz.gov) per CRS 24-103-211

B. Minority Business Enterprise (MBE) means, for the purpose of this report, a business enterprise at least 51 percent that is owned and controlled by minority group members, or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned and controlled by minority group members. Eligible persons are expected to be engaged full time in the day-to-day operation and management of the business. Minority group members are ethnic minorities including African American, Hispanic American, Native American or Asian/Pacific American.

C. Women Business Enterprise (WBE) means, for the purpose of this report, a business enterprise of at least 51 percent of which is owned and controlled by a woman or women, or, in the case of a publicly-owned business, at least 51 percent of the stock of which is owned and controlled by women. Women are expected to be engaged full time in the day-to-day operation and management of the business.

D. The University of Colorado Denver does not have a certification process for nor does it require MBE's and WBE's to be certified.

E. The percentages of service-disabled veteran, minority and women-owned business participation will be determined by dollar value of the work subcontracted to or joint ventured with service-disabled veteran, minority, and women-owned firms, as compared to the total dollar value of the bid amount for all work bid under this contract.

F. Prior to the award of this contract, the contractor will be required to provide to the Principal Representative a list of SDV/M/WBE enterprises, stipulating the dollar amount of each subcontract or supplier of materials on page 2 of this Service-Disabled Veteran, Minority and Women Business Enterprises Participation Report.

G. The contractor will retain records and documents showing the level of participation for two years following completion of this contract. These records and documents, or copies thereof, will be made available at reasonable times and places for inspection by an authorized representative of the Principal Representative, or its designated representatives, and will be submitted to such representatives upon written request.

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR:

SDVOE: Yes ☐ No ☐ MBE: Yes ☐ No ☐ WBE: Yes ☐ No ☐

Total Contract Amount: $ _____

Name and Address of SDV/M/WBE Subcontractors and/or Suppliers and/or Self-Performed Work by SDV/M/WBE Primes*	**SDVE Contract Amounts**	**MBE Contract Amounts**	**WBE Contract Amounts**	**Type of Work**

*Indicate ethnicity based on Paragraph III. A. above.

Total SDVE Contracts $ _____

Total MBE Contracts: $ _____

Total WBE Contracts: $ _____

Total SDVE % _____

Total MBE %: _____

Total WBE %: _____

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF FINAL ACCEPTANCE

Date of Notice of Acceptance: _____

Date to be inserted by A/E after consultation with the Principal Representative

Institution/Agency: University of Colorado Denver

Project No./Name: **20-115536 / Perinatal Replace Chiller 2**

TO:

Notice is hereby given that the State of Colorado, acting by and through the _____, accepts as complete* the above numbered project.

State Buildings Programs (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

*When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative.

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF CONTRACTOR'S SETTLEMENT

Institution/Agency: University of Colorado Denver
Notice Number:
Project No./Title: 20-115536 / Perinatal Replace Chiller 2

Notice is hereby given that on ____*date*____ at ____*address*_____ Colorado, final settlement will be made by the STATE OF COLORADO with _____*vendor name*_____, hereinafter called the "CONTRACTOR", for and on account of the contract for the construction of a PROJECT as referenced above.

1. Any person, co-partnership, association or corporation who has an unpaid claim against the said project, for or on account of the furnishing of labor, materials, team hire, sustenance, provisions, provender, rental machinery, tools. or equipment and other supplies used or consumed by such Contractor or any of his subcontractors In or about the performance of said work, may at any time up to and including said time of such final settlement, file a verified statement of the amount due and unpaid on account of such claim

2. All such claims shall be filed with the Authority for College, Institution, Department or Agency.

3. Failure on the part of a creditor to file such statement prior to such final settlement will relieve the State of Colorado from any and all liability for such claim

Authorized Facility Manager or Authorized Individual

Name: _____
Approval Date: _____
Agency: _____
Phone: _____
Fax: _____
Email: _____

MEDIA OF PUBLICATION:

PUBLICATION DATES:
First:

Second: (At least ten (10) days prior to above settlement date)

NOTES TO EDITOR:

Transmit two (2) copies of the Affidavit of Publication, and invoice, to:

Facilities Management
Building Department
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

State of Colorado
Office of the State Architect
STATE BUILDINGS PROGRAM

BUILDING INSPECTION RECORD

Institution/Agency:		**Permit #:**	
Project:		**Type of Construction:**	
Bldg. Code Official/Review Agent:		**Occupancy Class:**	
Architect/Engineer:		**Project Manager:**	
Contractor:		**Notice to Proceed Date:**	
P.M. Signature @ Completion:		**Completion Date:**	
Inspector Signature @ Completion:		**Bldg. Official Initials:**	

***NO WORK SHALL BE COVERED OR CONCEALED UNTIL THE APPROPRIATE INSPECTOR HAS INSPECTED AND APPROVED.**
****TWENTY-FOUR (24) HOUR NOTICE IS REQUIRED FOR ALL INSPECTIONS.**
*****INSPECTION WILL NOT BE PERFORMED IF THIS CARD IS NOT POSTED AND READILY AVAILABLE AT THE JOB SITE.**
CONTRACTOR: RETURN THIS AND ALL INSPECTION RECORDS TO THE PROJECT MANAGER UPON COMPLETION OF FINAL INSPECTION.

	Type of Inspection	Date	Inspector/Certification	Comments/Corrections
	EARTHWORK			
☐	Excavation/Open Hole			
☐	Backfill			
☐	Perimeter Drain/Bedded			
☐	Irrigation/Landscape			
	CONCRETE			
☐	Caissons/During Drill			
☐	Footings/Reinforcement			
☐	Foundations/Reinforcement			
☐	Slab on Grade/Reinforcement/Grade			
☐	Elevated Slab/Reinforcement			
	BUILDING			
☐	Rough Frame: structural (AFTER M/E/P)			
☐	Rough Frame: non-bearing (AFTER M/E/P)			
☐	Drywall (Gyp)/Non-rated			
☐	Drywall (Gyp)/Rated Assemblies			
☐	Finish/'Fire' Tape			
☐	Fire-Resistant Penetrations			
☐	Insulation			
☐	Water/Damp Proofing - exterior			
☐	Water/Damp Proofing - under slab			
☐	Roofing - insulation			
☐	Roofing - membrane			
☐	Roofing - warranty acceptance			
☐	Building Final Inspection			
	SPECIALTY (per IBC/consultant)			
☐	Concrete			
☐	Masonry			
☐	Wood			
☐	Steel/Welding			
☐	Spray-applied Fireproofing			
☐	Smoke Control Systems			
☐	Elevator/Conveyance			
☐	Seismic Resistance			
☐	Boiler			
☐	Health Department			
☐	CDPS/DFPC Sign-Off Complete			

NOTES / COMMENTS

Facilities Management
Building Department
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

State of Colorado
Office of the State Architect
STATE BUILDINGS PROGRAM

ELECTRICAL/LV-OIT/FIRE ALARM INSPECTION RECORD

Institution/Agency:		Permit #:	
Project:		Type of Construction:	
Bldg. Code Official/Review Agent:		Occupancy Class:	
Architect/Engineer:		Project Manager:	
Contractor:		Notice to Proceed Date:	
P.M. Signature @ Completion:		Completion Date:	
Inspector Signature @ Completion:		Bldg. Official Initials:	

*NO WORK SHALL BE COVERED OR CONCEALED UNTIL THE APPROPRIATE INSPECTOR HAS INSPECTED AND APPROVED.
**TWENTY-FOUR (24) HOUR NOTICE IS REQUIRED FOR ALL INSPECTIONS.
***INSPECTION WILL NOT BE PERFORMED IF THIS CARD IS NOT POSTED AND READILY AVAILABLE AT THE JOB SITE.
CONTRACTOR: RETURN THIS AND ALL INSPECTION RECORDS TO THE PROJECT MANAGER UPON COMPLETION OF FINAL INSPECTION.

	Type of Inspection	Date	Inspector/Certification	Comments/Corrections
	UNDERGROUND			
☐	Excavation/Open Hole/Bedded			
☐	Backfill			
☐	Duct Bank			
☐	Materials			
☐	Utility Tie-in			
	ROUGH-IN (including all LV/OIT)			
☐	Conduit/Support/Hangers			
☐	Boxes/Fittings			
☐	Box Labeling/I.D.			
☐	Equipment Accessibility			
☐	Raceway Fill/Limits			
☐	Above Ceiling			
☐	Fire-resistive Penetrations			
	SERVICE EQUIPMENT			
☐	Labeling/I.D.			
☐	Sizing/Requirements			
☐	Clearances			
☐	Terminations			
	GENERATOR/EM POWER			
☐	ATS Test			
☐	Load Test			
☐	Emergency/Exit Lighting			
	ELECTRICAL FINAL			
☐	Article 110.12/Execution of Work			
☐	Terminations			
☐	Fixtures/Appliances			
☐	Final			
	FIRE ALARM			
☐	Rough-In/Raceway & Wire			
☐	Labeling/I.D.			
☐	Initiation Devices			
☐	Notification Devices			
☐	Pre-Test Completed			
☐	Verify Visible/Audible Notification			
☐	Way-Finding Verification			
☐	Plans/Specs/Test Records Received			
☐	Final			

NOTES / COMMENTS

Facilities Management
Building Department
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

State of Colorado
Office of the State Architect
STATE BUILDINGS PROGRAM

MECHANICAL/MED GAS INSPECTION RECORD

Institution/Agency:		Permit #:	
Project:		Type of Construction:	
Bldg. Code Official/Review Agent:		Occupancy Class:	
Architect/Engineer:		Project Manager:	
Contractor:		Notice to Proceed Date:	
P.M. Signature @ Completion:		Completion Date:	
Inspector Signature @ Completion:		Bldg. Official Initials:	

*NO WORK SHALL BE COVERED OR CONCEALED UNTIL THE APPROPRIATE INSPECTOR HAS INSPECTED AND APPROVED.
**TWENTY-FOUR (24) HOUR NOTICE IS REQUIRED FOR ALL INSPECTIONS.
***INSPECTION WILL NOT BE PERFORMED IF THIS CARD IS NOT POSTED AND READILY AVAILABLE AT THE JOB SITE.
CONTRACTOR: RETURN THIS AND ALL INSPECTION RECORDS TO THE PROJECT MANAGER UPON COMPLETION OF FINAL INSPECTION.

	Type of Inspection	Date	Inspector/Certification	Comments/Corrections
	UNDERGROUND PIPING			
☐	Excavation/Open Hole/Bedded			
☐	Backfill			
☐	Rough-In – Test PSI (hydronic/air)			
☐	Welding			
☐	Insulation			
☐	Flushing/Treatment			
☐	Connection to Equipment			
	PROCESS PIPING			
☐	Rough-In – Test PSI (hydronic/air)			
☐	Welding			
☐	Insulation/Support			
☐	Labeling/I.D.			
☐	Flushing/Treatment			
☐	Connection to Equipment			
	REFRIGERATION			
☐	Rough-In – Test PSI (field test)			
☐	Insulation/Support			
☐	Connection to Equipment			
	DUCT/SHEET METAL			
☐	Fitting/Pre-Install			
☐	Rough-In/Supports			
☐	Test PSI – W.G. (med./high pressure)			
☐	Insulation/Liners			
☐	Fire/Smoke Damper Test			
☐	Kitchen Hood Exhaust - Performance			
☐	Connection to Equipment			
	MECHANICAL FINAL			
☐	Final			
	MED/ALT GAS SYSTEMS			
☐	Qualification of Installer (ASSE 6010)			
☐	Brazing Qualification (ASME/AWS B2.2)			
☐	Piping Verification			
☐	Rough-In – Test PSI (24-hr standing)			
☐	Rough-In – Test HgV (24-hr standing)			
☐	Labeling/I.D.			
☐	System Verification/Final			

NOTES / COMMENTS

Facilities Management
Building Department
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

State of Colorado
Office of the State Architect
STATE BUILDINGS PROGRAM

PLUMBING/FUEL GAS INSPECTION RECORD

Institution/Agency:		Permit #:	
Project:		Type of Construction:	
Bldg. Code Official/Review Agent:		Occupancy Class:	
Architect/Engineer:		Project Manager:	
Contractor:		Notice to Proceed Date:	
P.M. Signature @ Completion:		Completion Date:	
Inspector Signature @ Completion:		Bldg. Official Initials:	

*NO WORK SHALL BE COVERED OR CONCEALED UNTIL THE APPROPRIATE INSPECTOR HAS INSPECTED AND APPROVED.
**TWENTY-FOUR (24) HOUR NOTICE IS REQUIRED FOR ALL INSPECTIONS.
***INSPECTION WILL NOT BE PERFORMED IF THIS CARD IS NOT POSTED AND READILY AVAILABLE AT THE JOB SITE.
CONTRACTOR: RETURN THIS AND ALL INSPECTION RECORDS TO THE PROJECT MANAGER UPON COMPLETION OF FINAL INSPECTION.

	Type of Inspection	Date	Inspector/Certification	Comments/Corrections
	EARTHWORK			
☐	Excavation/Open Hole/Bedded			
☐	Backfill			
☐	Thrust Restraint			
☐	Insulation			
☐	Utility Tie-in			
	DOMESTIC/POTABLE			
☐	Distribution – Test PSI			
☐	In-wall rough			
☐	Insulation			
☐	Roof Drain Leaders – water test			
☐	Sanitary Waste/Vent – water test			
☐	Labeling/I.D.			
☐	Above Ceiling			
☐	Support/Hangers/Slope			
☐	Thrust Restraint/Seismic Restraint			
☐	Fire-resistive Penetrations			
	EQUIPMENT			
☐	Water Heater			
☐	Roof Drains/Overflows			
☐	Back-Flow Devices			
☐	Traps/Primers			
	PLUMBING FINAL			
☐	Water Distribution/Flush & Test			
☐	Fixtures/Mixing Valves/Connections			
☐	Chlorination			
☐	Final			
	FUEL GAS SYSTEMS			
☐	Purge			
☐	Pipe Size Verification			
☐	Rough-In – Test PSI			
☐	Welding			
☐	Support/Hangers/Piping Locations			
☐	Venting			
☐	Labeling/I.D.			
☐	Connection to Equipment			

NOTES / COMMENTS

Facilities Management
Building Department
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

State of Colorado
Office of the State Architect
STATE BUILDINGS PROGRAM

FIRE SUPPRESSION INSPECTION RECORD

Institution/Agency:		**Permit #:**	
Project:		**Type of Construction:**	
Bldg. Code Official/Review Agent:		**Occupancy Class:**	
Architect/Engineer:		**Project Manager:**	
Contractor:		**Notice to Proceed Date:**	
P.M. Signature @ Completion:		**Completion Date:**	
Inspector Signature @ Completion:		**Bldg. Official Initials:**	

*NO WORK SHALL BE COVERED OR CONCEALED UNTIL THE APPROPRIATE INSPECTOR HAS INSPECTED AND APPROVED.
**TWENTY-FOUR (24) HOUR NOTICE IS REQUIRED FOR ALL INSPECTIONS.
***INSPECTION WILL NOT BE PERFORMED IF THIS CARD IS NOT POSTED AND READILY AVAILABLE AT THE JOB SITE.
CONTRACTOR: RETURN THIS AND ALL INSPECTION RECORDS TO THE PROJECT MANAGER UPON COMPLETION OF FINAL INSPECTION.

	Type of Inspection	Date	Inspector/Certification	Comments/Corrections
	UNDERGROUND			
☐	Excavation/Open Hole			
☐	Backfill			
☐	Utility Tie-in: Visual Observation			
☐	Flushing, min. 10 ft/sec.			
☐	Hydrostatic Test, min. 200psi – 2 hr.			
☐	Backflow			
	ROUGH-IN			
☐	Hydrostatic Test, min. 200psi – 2 hr.			
☐	Risers – Supply & Drain			
☐	Support/Hangers			
☐	Surge Clips – Pumped bldgs. only			
☐	Cross Mains/Branch Lines			
☐	Valves/Drain Connections, Discharge			
☐	FDC			
☐	Dry/Pre Action: Air Test, min 40psi – 24 hr.			
	STATIONARY FIRE PUMP			
☐	Flushing, min 10 ft/sec.			
☐	Hydrostatic Test, min 200psi – 2 hr.			
☐	Pump Curve Supplied			
☐	Flow Test			
☐	Variable Speed Tests			
☐	Ampere/Voltage Readings			
☐	Alternate Power Supply			
	ACCEPTANCE/FINAL			
☐	Caps/Straps Removed			
☐	Waterflow			
☐	Main Drain			
☐	Control Valves			
☐	PRV's			
☐	Backflow			
☐	Dry/Pre-Action: Trip Test			
☐	Dry/Pre-Action: Automatic Operation			
☐	Design Information Signage			
☐	General Information Signage			
☐	Final			

NOTES / COMMENTS

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD (D/B/B) AGREEMENT

(STATE FORM SC-6.21)

DEPARTMENT ID: GFE

CONTRACT ID #: NA

PROJECT #: _____

PROJECT NAME: _____

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

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EXHIBITS:

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B. Performance Bond (Form SC-6.22)
C. Labor and Material Payment Bond (Form SC-6.221)
D. Insurance Certificates
E. Certification and Affidavit Regarding Unauthorized Immigrants (required at contract signing prior to commencing work)
F. Building Code Compliance Policy: Coordination of Approved Building Codes, Plan Reviews and Building Inspections.
https://www.colorado.gov/pacific/sites/default/files/BuildingCodeCompliancePolicy_2.pdf
G. University of Colorado Denver Supplementary Conditions
H. Service-Disabled Veteran-Owned Small Business and Minority/Women Business Enterprise Participation Report

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD (D/B/B) AGREEMENT
(STATE FORM SC-6.21)

Department ID: GFE Contract ID #: NA Project #: _____

1. PARTIES. THIS AGREEMENT is entered into by and between the STATE OF COLORADO, acting by and through the Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver, hereinafter referred to as the Principal Representative, and *(vendor name)* having its offices at *(vendor address)* hereinafter referred to as the Contractor.

2. EFFECTIVE DATE AND NOTICE OF NONLIABILITY. This Agreement shall not be effective or enforceable until it is approved and signed by the State Controller or its designee (hereinafter called the "Effective Date"), but shall be effective and enforceable thereafter in accordance with its provisions. The State shall not be liable to pay or reimburse Contractor for any performance hereunder or be bound by any provision hereof prior to the Effective Date.

RECITALS:

WHEREAS, the Principal Representative intends to *(project name)* hereinafter called the Project; and

WHEREAS, authority exists in the Law and Funds have been budgeted, appropriated, and otherwise made available, and a sufficient unencumbered balance thereof remains available for payment In Fund Number _____, Account Number _____; and

WHEREAS, this is a phase one waived contract, waiver number 156 Contractors Agreement for Capital Construction Form SC6.21.

WITNESSETH, that the State of Colorado and the Contractor agree as follows:

ARTICLE 1. PERFORMANCE OF THE WORK
The Contractor shall perform all of the Work required for the complete and prompt execution of everything described or shown in, or reasonably implied from the Contract Documents for the above referenced Project.

ARTICLE 2. PROVISIONS OF THE CONTRACT DOCUMENTS
The Contractor agrees to perform the Work to the highest industry standards and to the satisfaction of the State of Colorado and its Architect/Engineer in strict accordance with the provisions of the Contract Documents.

ARTICLE 3. TIME OF COMPLETION
The Contractor agrees to Substantially Complete the Project within _____ calendar days from the date of the Notice to Proceed, in addition, the Contractor agrees to finally complete the Project from Substantial Completion to Final Acceptance within _____ calendar days for a total

time of completion of the entire Project of ____ calendar days. The Contractor shall perform the Work with due diligence to completion.

ARTICLE 4. ESSENTIAL CONDITION

Timely completion of the Project is an essential condition of this Agreement. The Contractor shall be subject to any liquidated damages described in Article 7.4 for failure to satisfactorily complete the Work within the time periods in Article 3 above.

ARTICLE 5. CONTRACT SUM

The Contractor shall be paid for the performance of this Agreement, subject to any additions and deductions as provided for in Articles 32, 34 and 35 of The General Conditions of the Construction Contract SC-6.23, the sum of _____ DOLLARS AND NO/100* ($_____*).

ARTICLE 6. CONTRACT DOCUMENTS

The Contract Documents, as enumerated in Article 1 of The General Conditions of the Contractor's Design/Bid/Build (D/B/B) Agreement SC-6.23, are all essential parts of this Agreement and are fully incorporated herein.

ARTICLE 7. OPTIONAL PROVISIONS AND ELECTIONS

The provisions of this Article 7 alter the Articles (The General Conditions of the Contractor's Design/Bid/Build Agreement SC-6.23) or enlarge upon them as indicated:
The Principal Representative and or the State Buildings Program shall mark boxes and initial where applicable.

1. MODIFICATION OF ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION
If the box below is marked the six month guarantee inspection is not required.
☐ _____ Principal Representative initial

2. MODIFICATION OF ARTICLE 27. LABOR AND WAGES
If the box is marked the Federal Davis-Bacon Act shall be applicable to the Project. The minimum wage rates to be paid on the Project shall be furnished by the Principal Representative and included in the Contract Documents.
☐ _____ Principal Representative initial

3. MODIFICATION OF ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS
If the box is marked, and initialed by the State as noted, the requirement to participate in facilitated negotiations shall be deleted from this Contract. Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, shall be deleted in its entirety and all references to the right to the same where ever they appear in the contract shall be similarly deleted.
The box may be marked only for projects with an estimated value of less than $500,000.
☐ _____ Principal Representative initial

4. MODIFICATION OF ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES

If an amount is indicated immediately below, liquidated damages shall be applicable to this Project as, and to, the extent shown below. Where an amount is indicated below, liquidated damages shall be assessed in accordance with and pursuant to the terms of The General Conditions of the Design/Bid/Build Agreement Article 46, Time of Completion And Liquidated Damages, in the amounts and as here indicated. The election of liquidated damages shall limit and control the parties right to damages only to the extent noted.

1. For the inability to use the Project, for each day after the number of calendar days specified in the Contractor's bid for the Project and the Agreement for achievement of Substantial Completion, until the day that the Project has achieved Substantial Completion and the Notice of Substantial Completion is issued, the Contractor agrees that an amount equal to _____ ($) shall be assessed against Contractor from amounts due and payable to the Contractor under the Contract, or the Contractor and the Contractor's Surety shall pay to the Principal Representative such sum for any deficiency, if amounts on account thereof are deducted from remaining amounts due, but amounts remaining are insufficient to cover the entire assessment.

2. For damages related to or arising from additional administrative, technical, supervisory and professional expenses related to and arising from the extended closeout period, for each day in excess of the number of calendar days specified in the Contractor's bid for the Project and the Agreement to finally complete the Project as defined by the issuance of the Notice of Final Acceptance) after the issuance of the final Notice of Substantial Completion, the Contractor agrees that an amount equal to _____ ($) shall be assessed against Contractor from amounts due and payable to the Contractor under the Contract, or the Contractor and the Contractor's Surety shall pay to the Principal Representative such sum for any deficiency, if amounts on account thereof are deducted from remaining amounts due but amounts remaining are insufficient to cover the entire assessment.

5. NOTICE IDENTIFICATION

All Notices pertaining to General Conditions or otherwise required to be given shall be transmitted in writing, to the individuals at the addresses listed below, and shall be deemed duly given when received by the parties at their addresses below or any subsequent persons or addresses provided to the other party in writing.

Notice to Principal Representative: Michael J Barden
Director of Facilities Projects
University of Colorado Denver
1945 Wheeling Street, Campus Box F-418
Aurora, Co 80045

With copies to: Todd Akey
State Buildings Delegate
University of Colorado Denver
1945 Wheeling Street, Campus Box F-418
Aurora, Co 80045

Notice to Contractor:

With copies to:

SIGNATURE APPROVALS:

THE PARTIES HERETO HAVE EXECUTED THIS CONTRACT

*Persons signing for Contractor hereby swear and affirm that they are authorized to act on Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted**

THE CONTRACTOR

_____
Legal Name of Contracting Entity

_____
*Signature

By _____
Name (print) Title

Date: _____

STATE OF COLORADO, acting by and through: the Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver

By: _____
Michael J. Barden,
Director of Facilities Projects

Date: _____

APPROVED
DEPARTMENT OF PERSONNEL & ADMINISTRATION
STATE BUILDINGS PROGRAM
State Architect (or authorized Delegate)

By: _____
Todd Akey, Delegate

Date: _____

ALL CONTRACTS MUST BE APPROVED BY THE STATE CONTROLLER:
CRS §24-30-202 requires the State Controller to approve all State Contracts. This Contract is not valid until signed and dated below by the State Controller or delegate. Contractor is not authorized to begin performance until such time. If Contractor begins performing prior thereto, the State of Colorado is not obligated to pay Contactor for such performance or for any goods and/or services provided hereunder.

APPROVED:
STATE OF COLORADO
STATE CONTROLLER'S OFFICE
State Controller (or authorized Delegate)

By: _____
Amy Gannon, Associate Vice Chancellor for Financial Services and Controller or Delegate

Date: _____

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT A

CONTRACTOR'S BID (Form SBP-6.13)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT B

PERFORMANCE BOND (Form SC-6.22)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT C

LABOR AND MATERIAL PAYMENT BOND (Form SC-6.221)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT D

INSURANCE CERTIFICATE(S) (attached)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT E

Certification and Affidavit Regarding Unauthorized Immigrants (required at contract signing prior to commencing work) (UI-1, attached)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.21)

EXHIBIT F

Building Code Compliance Policy: Coordination of Approved Building Codes, Plan Reviews and Building Inspections

https://www.colorado.gov/pacific/sites/default/files/BuildingCodeCompliancePolicy_2.pdf

STATE OF COLORADO
CONTRACTOR'S AGREEMENT DESIGN/BID/BUILD
(STATE FORM SC-6.21)

EXHIBIT G

UNIVERSITY OF COLORADO DENVER SUPPLEMENTARY CONDITIONS

UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS

SUPPLEMENTARY GENERAL CONDITIONS

For Design Bid Build Contractor Agreement and General Conditions of the Contract
(SC6.21 and SC6.23)
for the Denver Campus and Anschutz Medical Campus

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ARTICLE 53. MISCELLANEOUS PROVISIONS

APPENDIX A University of Colorado Anschutz Medical Campus Tax Information

ARTICLE 25. INSURANCE – Replace Article 25 as follows:

The term University, University of Colorado, University of Colorado Anschutz Medical Campus, Principal Representative, are the interchangeable for this replacement of article 25.

For purposes of this supplement "Contractor" as used herein shall mean, as appropriate to the State Contract form being used, Contractor, Standing Order Contractor, Construction Manager/General Contractor, or Design/Build Entity.

The Contractor shall obtain and maintain, at its own expense and for the duration of the contract including any warranty periods under the Contract are satisfied, the insurance coverages set forth below.

By requiring such insurance, the Principal Representative shall not be deemed or construed to have assessed the risk that may be applicable to the Contractor its agents, representatives, employees or subcontractors under this contract. The insurance requirements herein for this Contract in no way limit the indemnity covenants contained in the Contract. The Principal Representative in no way warrants that the limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, its agents, representatives, employees, or subcontractors. The Contractor shall assess its own risks and if it deems appropriate and/or prudent, maintain higher limits and/or broader coverages. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration, or types.

COVERAGES AND LIMITS OF INSURANCE - - Contractor shall provide coverage with limits of liability not less than those stated below.

1. ***Commercial General Liability – ISO CG 0001 or equivalent. Coverage to include:***
   - Premises and Operations
   - Explosions, Collapse and Underground Hazards
   - Personal / Advertising Injury
   - Products / Completed Operations
   - Liability assumed under an Insured Contract (including defense costs assumed under contract)
   - Independent Contractors
   - Designated Construction Projects(s) General Aggregate Limit, ISO CG 2503 (1997 Edition)
   - Additional Insured—Owners, Lessees or Contractors Endorsement, ISO Form 2010 (2004 Edition or equivalent)
   - Additional Insured—Owners, Lessees or Contractors Endorsement (Completed Operations), ISO CG 2037 (7/2004 Edition or equivalent)
   - **The policy shall be endorsed to include the following additional insured language on the Additional Insured Endorsements specified above: "The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Contractor, including completed operations".**

- Commercial General Liability Completed Operations policies must be kept in effect for up to three (3) years after completion of the project. For buildings with a construction cost
  greater than $99 million, the Commercial General Liability Completed Operations policies must be kept in effect for up to eight (8) years after the completion of the project.
- **An umbrella and/or excess liability policy may be used to meet the minimum liability requirements provided that the coverage is written on a "following form" basis.**

Liability Limits	General Aggregate	Products/Completed Operation Aggregate	Each Occurrence	Personal/Advertising Injury
Primary General Liability	$2,000,000	$2,000,000	$1,000,0000	$1,000,000
Umbrella or Excess Liability*	$5,000,000	$5,000,000	$5,000,000	$5,000,000

***Umbrella or Excess Liability does not apply to projects totaling $500, 000 or under.**

The following exclusionary endorsements are prohibited in the CGL policy:

1. Damage to work performed by subcontract/vendor (CG 22-94 or similar);
2. Contractual liability coverage exclusion modifying or deleting the definition of an "insured contract";
3. If applicable to the work to be performed: Residential or multi-family;
4. If applicable to the work to be performed: Exterior insulation finish systems;
5. If applicable to the work to be performed: Subsidence or earth movement.

2. ***Automobile Liability***

Bodily Injury and Property Damage for any owned, hired, and non-owned vehicles used in the performance of this contract

Minimum Limits:

Bodily Injury/Property Damage (Each Accident) $ 1,000,000

3. ***Workers Compensation***
   - Statutory Benefits (Coverage A)
   - Employers Liability (Coverage B)

   a. Policy shall contain a waiver of subrogation in favor of the Principal Representative.
   b. This requirement shall not apply when a contractor or subcontractor is exempt under Colorado Workers' Compensation Act., **AND** when such contractor or subcontractor executes the appropriate sole proprietor waiver form.

Minimum Limits:

Coverage A (Workers' Compensation)	Statutory	
Coverage B (Employers Liability)		
Each accident	$	100,000
Disease each employee	$	100,000
Disease policy limit	$	500,000

4. ***Contractors Pollution Liability***

- Coverage shall apply to sudden and gradual pollution conditions resulting from the escape of release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants (including asbestos). Policy shall cover the Contractor's completed operations.
- If the coverage is written on a claims-made basis, the Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of this Contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning from the time that work under this contract is completed.
- **The policy shall be endorsed to include the following as Additional Insureds: The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Construction Manager, including completed operations.**
- Endorsements CA9948 and MCS-90 are required on the Automobile Liability Coverage if the Contractor is transporting any type of hazardous materials.
- **Contractors Pollution Liability policies must be kept in effect for up to three (3) years after completion of the project.**

Minimum Limits (Projects at or under $500,000):

Per Loss	$	1,000,000
Aggregate	$	1,000,000

Minimum Limits (Projects over $500,000):

Per Loss	$	2,000,000
Aggregate	$	2,000,000

5. ***Professional Liability (Errors and Omissions)***

(This Professional Liability requirement applies only to Design/Build Entity SC-8.0 and 9.0.)

- The Contractor shall maintain Errors and Omissions Liability covering negligent acts, errors and/or omissions, including design errors of the Contractor for damage sustained by reason of or in the course of operations under this Contract. The policy/coverages shall be amended to include the following:

  Amendment of any Contractual Liability Exclusion to state: "This exclusion does not apply to any liability of others which you assume under a written contract provided such liability is caused by your negligent acts."

- In the event that any professional liability insurance required by this Contract is written on a claims-made basis, Contractor warrants that any retroactive date under the policy shall precede the effective date of this Contract; and that either continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning at the time work under this Contract is completed.
- Policy shall contain a waiver of subrogation against The Regents of the University of Colorado, a Body Corporate.

Wrongful Act	$2,000,000
General Aggregate	$2,000,000

6. ***Builder's Risk/ Installation Floater***

Unless otherwise provided or instructed by the Principal Representative, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the project is located, Builder's Risk Insurance in the amount of the initial contract amount as well as subsequent modifications for the entire project at the site on a replacement cost basis without optional deductibles. This coverage is required for new buildings or additions to existing buildings and for materials and equipment to be installed in existing structures.

- Covered Cause of Loss: Special Form
- Include Theft and Vandalism
- Labor costs to repair damaged work
- Shall be written for 100% of the completed value (replacement cost basis)
- Deductible maximum is $50,000.00
- Waiver of Subrogation is to apply
- The Regents of the University of Colorado, a body corporate, shall be added as **Additional Named Insured on Builders Risk**.

1. Policy must provide coverage from the time any covered property becomes the responsibility of the Contractor, and continue without interruption during construction, renovation, or installation, including any time during which the covered property is being transported to the construction installation site, or awaiting installation, whether on or off site.
2. The Policy shall be maintained, unless otherwise provided in the contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Principal Representative has insurable interest in the property to be covered, whichever is later.
3. The Builder's Risk insurance shall include interests of the Principal Representative, and if applicable, affiliated or associated entities, the General Contractor, subcontractors and sub-tier contractors in the project.
4. Builders' Risk Coverage shall be on a **Special** Covered Cause of Loss Form and shall include theft, vandalism, malicious mischief, collapse, false-work, temporary buildings and debris removal including demolition, increased cost of construction, architect's fees and expenses, flood (including water damage), earthquake, and if applicable, all below and above ground structures, piping, foundations including underground water and sewer mains, piling including the ground on which the structure rests and excavation, backfilling, filling, and grading. Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) shall be included as required by the Contract Documents or by

law, which shall specifically cover insured equipment during installation and testing (including hot testing, where applicable). Other coverages may be required if provided in contract documents.

5. The Builders' Risk shall be written for 100% of the completed value (replacement cost basis) of the work being performed. The Builders' Risk shall include the following provisions:
   a. Replacement Cost Basis - including modification of the valuation clause to cover all costs needed to repair the structure or work (including overhead and profits) and will pay based on the values figured at the time of rebuilding or repairing, not at the time of loss
   b. Modify or delete exclusion pertaining to damage to interior of building caused by an perils insured against are covered; also provide coverage for water damage

   Note, if the addition, or renovation is to an existing building, The Principal Representative requires that the Contractor provide as an option to include the existing building into the Builders' Risk Policy. The Principal Representative shall provide the replacement cost value of the existing building

6. At the option of the Principal Representative, the Principal Representative may include Soft Costs (including Loss of Use)/Delay in Opening Endorsement under the builder's risk policy. The Principal Representative agrees to provide the necessary exposure base information for quotation by the Builder's Risk carrier. The Principal Representative agrees to pay the premium associated with the Soft Costs coverage, the Principal Representative decides to purchase this coverage.

7. The Builders' Risk Policy shall specifically permit occupancy of the building during construction. Partial occupancy or use of the work shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use. The Principal Representative and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and delete any provisions with regard to restrictions within any Occupancy Clauses within the Builders' Risk Policy. The Builders' Risk Policy shall remain in force until acceptance of the project by the Principal Representative.

8. The deductible shall not exceed $50,000 and shall be the responsibility of the Contractor except for losses such as flood (not water damage), earthquake, windstorm, tsunami, volcano, etc. Losses in excess of $50,000 insured shall be adjusted in conjunction with the Principal Representative. Any insurance payments/proceeds shall be made payable to the Principal Representative subject to requirements of any applicable mortgagee clause. The Contractor shall pay subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require subcontractors to make payments to their sub-subcontractors in similar manner.

   The Principal Representative shall have the authority to adjust and settle any losses in excess of $50,000 with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Principal Representative exercise of this power. It is expressly agreed that nothing in this section shall be subject to arbitration and any references to arbitration are expressly deleted.

9. The Contractor is responsible for providing 45 days' notice of cancellation to the Principal Representative. The policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to the Project.

   If the Contractor does not intend to purchase such Builder's Risk Insurance required by the Contract and with all of the coverages in the amount described above, the

Contractor shall so inform the Principal Representative as stated in writing prior to commencement of the work. The Principal Representative may then affect insurance that will protect the interests of the Principal Representative, the General Contractor, Subcontractors and sub-tier contractors in the project. Coverages applying shall be the same as stated above including other coverages that may be required by the Principal Representative. The cost shall be charged to the Contractor. Coverage shall be written for 100% of the completed value of the work being performed, with a deductible not to exceed $50,000 per occurrence for most projects.

All deductibles will be assumed by the Contractor. Waiver of Subrogation is to apply against all parties named as insureds, but only to the extent the loss is covered, and Beneficial Occupancy Endorsements are to apply.

If the Principal Representative is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the Principal Representative, then the Contractor shall bear all reasonable costs properly attributable thereto.

ADDITIONAL INSURANCE REQUIREMENTS

1. All insurers must be licensed or approved to do business within the State of Colorado, and unless otherwise specified, all policies must be written on a per occurrence basis.
2. Contractor's insurance carrier should possess a minimum A.M. Best's Insurance Guide rating of A- VI.
3. On insurance policies where the Principal Representative are named as additional insureds, the Principal Representative shall be additional insureds to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Contract.
4. Contractor shall furnish the Principal Representative with certificates of insurance (ACORD form or equivalent approved by the Principal Representative) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.
   All certificates and any required endorsements are to be received and approved by the Principal Representative before work commences. Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of contract.
5. Upon request by the Principal Representative, Contractor must provide a copy of the actual insurance policy effecting coverage(s) required by the contract.
6. The Contractor's insurance coverage shall be primary insurance and non-contributory with respect to all other available resources.
7. The Contractor shall advise the Principal Representative in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limit. At their own expense, the Contractor will reinstate the aggregate limits to comply with the minimum requirements and shall furnish to the Principal Representative a new certificate of insurance showing such coverage is in force.
8. Provide a minimum of thirty (30) days advance written notice to the Principal Representative for cancellation, non-renewal, or material changes to policies required under the Contract (45 days for builders' risk coverage.
9. Certificate Holder: The Regents of the University of Colorado, Project Management, 1945 North Wheeling Street, Campus Mail stop F-418, Aurora, CO 80045.

Failure of the Contractor to fully comply with these requirements during the term of the Contract may be considered a material breach of contract and may be cause for immediate termination of the Contract at the option of the Principal Representative. The Principal Representative reserves the right to negotiate additional specific insurance requirements at the time of the contract award.

Subcontractors

Contractor's certificate(s) shall include all subcontractors as additional insureds under its policies **or** subcontractors shall maintain separate insurance as determined by the Contractor, however, subcontractor's limits of liability shall not be less than $1,000,000 per occurrence / $2,000,000 aggregate.

Non-Waiver

The parties hereto understand and agree that The Principal Representative is relying on, and does not waive or intend to waive by any provision of this Contract, the monetary limitations or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, et seq., as from time to time amended, or otherwise available to the Principal Representative or its officers, employees, agents, and volunteers.

Mutual Cooperation
The Principal Representative and Contractor shall cooperate with each other in the collection of any insurance proceeds which may be payable in the event of any loss, including the execution and delivery of any proof of loss or other actions required to effect recovery.

(Revised 7-21-11)

ARTICLE 41. COMPLETION, FINAL INSPECTION, ACCEPTANCE AND SETTLEMENT – Add the following

Contractor will be required to complete items on University of Colorado Anschutz Medical Campus Supplemental Building / Project Acceptance List and attend walk-thrus and meetings necessary to complete the list, working through the university Project Manager (use University of Colorado Anschutz Medical Campus Supplemental / Project Acceptance List).

ARTICLE 52. SPECIAL PROVISIONS -Add the following:

M: UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS POLICY ON SEXUAL HARASSMENT

.1 The Architect/Engineer shall vigorously pursue to the greatest extent possible, adherence to the university Policy on Sexual Harassment and also require all employees, and employees of all professional consultants of any kind, working on this project to adhere to this Policy.

.2 Statement of Policy: It is the policy of the university to maintain the community as a place of work, study, and residence free of sexual harassment or exploitation of students, faculty, staff, and administrators. Sexual harassment is prohibited on campus and in the university programs. The university is committed to taking appropriate action against any of its officials, employees or students who violate the policy prohibiting sexual harassment.

.3 Definition of Sexual Harassment: For purposes of this Policy, sexual harassment is defined as conduct which is unwelcome and consists of:

1. sexual advances; 2. requests for sexual favors; or 3. other verbal or physical conduct of a sexual nature when submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic decisions affecting the individual; or when such conduct has the purpose or effect, of unreasonably interfering with an individual's work or academic performance by creating an intimidating, hostile, or offensive working or educational environment.

Conduct prohibited under this policy may occur between persons of the same sex or of different sexes and may manifest itself in different ways. For example, sexual harassment may be as undisguised as a direct solicitation of sexual favors, or arise from behavior which has the effect of creating an intimidating,

hostile, or offensive educational or working environment. In this regard, the following types of acts, if pervasive and continuous, are more likely than not to be considered sexual harassment: unwelcome physical contact, sexual remarks about a person's clothing, body, or sexual relations, conversation of a sexual nature or similar jokes and stories, and the display of sexually explicit materials in the workplace or their use in the classroom without defensible educational purpose.

.4 Consequence of Sexual Offenses: The university may require the Architect/Engineer to remove from the university property any individual or individuals who violate the policy prohibiting sexual harassment.

.5 Contractor acknowledges that all Contractor employees, agents and representatives providing services to the University of Colorado Denver | Anschutz Medical Campus are responsible for complying with University policies and procedures. This includes, without limitation, policies related to professional conduct, sexual misconduct (including non-consensual sexual intercourse, non-consensual sexual contact, sexual exploitation, sexual harassment, intimate partner abuse, and stalking), and discrimination and harassment based on protected characteristic identity (including race, color, national origin, pregnancy, sex, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation, or political philosophy). Please see http://equity.ucdenver.edu/policies-procedures/.

.6 Contractor agrees that its employees, agents and representatives who engage in conduct prohibited by University policies, including related retaliation or failure to report, as determined in the University's sole discretion, will be subject to disciplinary action, up to and including termination by Contractor consistent with Contractor's policies and procedures

.7 Further, as Contractor recognizes and agrees that its selection and hiring of individuals who possess expertise and professional skills to carry out Contractor's obligations in an appropriate and non-discriminatory manner that reflects positively on the University's goodwill and reputation is an essential condition to inducing the University to enter into the Agreement, Contractor agrees to remove or replace any individual whose work or performance under this Agreement is considered by the University as acting inappropriately, unprofessionally, or violating any University policy, in the University's sole discretion, including, without limitation, the aforementioned policies.

.8 Contractor acknowledges that Contractor's activities involve heightened risks as a result of access or exposure by Contractor's employees or agents to one or more security sensitive environments. Contractor expressly acknowledges that Contractor shall take all commercially reasonable measures to mitigate any such risks, which measures shall include but are not limited to conducting criminal history checks, financial background checks when appropriate, and reference checks on all employees or agents who will be performing work at the University. Upon University request, Contractor shall certify in writing that it has complied with this provision and that all employees, agents, and subcontractors performing work hereunder have satisfactorily completed Contractor's background check.

ARTICLE 53. MISCELLANEOUS PROVISIONS -Add the following:

L. All costs and time associated with obtaining a University security badge for Contractor employees working on campus shall be borne by the Contractor.

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS
SUPPLEMENTARY GENERAL CONDITIONS
For Design Bid Build Contractor Agreement and General Conditions of the Contract (SC6.21 and SC6.23)

APPENDIX A

Tax Information:

1. State of Colorado Certificate of Exemption for State Sales/Use Tax Only, dated August 25, 2009
2. Colorado Department of Revenue, Sales Tax Exemption Certificate Multi-Jurisdiction
3. City of Aurora Sales and Use Tax Exemption, dated March 12, 2001
3. City of County of Denver Tax Confirming Exemption Status, dated February 19, 2014
4. State of Colorado Letter Confirming Adams County, RTD, Stadium, and Cultural Tax Exemptions, dated April 7, 2006
5. Colorado Department of Revenue - Contractor Application for Exemption Certification

DR 0160 (02/16/11)
COLORADO DEPARTMENT OF REVENUE
DENVER CO 80261-0013

CERTIFICATE OF EXEMPTION FOR STATE SALES/USE TAX ONLY

THIS LICENSE IS NOT TRANSFERABLE

USE ACCOUNT NUMBER for all references	LIABILITY INFORMATION	ISSUE DATE
09802565	G 010180	Aug 25 2017

STATE OF COLORADO/ OFFICE OF STATE CONTROLLER
ATTN: OFFICE OF UNIVERSITY CONTROLLER
1800 N GRANT ST STE 600
DENVER CO 80203-1148

Executive Director
Department of Revenue

DR 0563 (08/30/13)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261-0013

130563 19999

Sales Tax Exemption Certificate
Multi - Jurisdiction

See page 2 for instructions

Last Name or Business Name	First Name	Middle Initial

Address		

City	State	ZIP

I Certify That

Name of Firm (Buyer)
The Regents of University of Colorado

Address
1800 Grant Street, Suite 600

City	State	ZIP
Denver	CO	80203

Qualifies As (Check each applicable item)

☐ Wholesaler ☐ Retailer ☐ Manufacturer ☐ Charitable or Religious

☒ Political Subdivision or Governmental Agency ☐ Other (Specify)

If Other, specify here

1) and is registered with the below listed states and cities within which your firm would deliver purchases to us which are for resale or lease by us in the normal course of our business which is Institution of Higher Education or

2) that such purchases are exempt from payment of sales or use tax in such states and cities because our buyer is:

☒ Political Subdivision or Governmental Agency ☐ Charitable or Religious ☐ Otherwise Exempt By Statute (Specify)

If Otherwise Exempt By Statue, specify here

City or State	State Registration or ID Number	City or State	State Registration or ID Number
City of Aurora	98-00799-0000	Colorado (Boulder campus)	98-02915-0000
Colorado	98-02565-0000	Texas	32002730391

If the list of states and cities is more than six(6), attach a list to this certificate.
I further certify that if any property so purchased tax free is used or consumed by the firm as to make it subject to a Sale or Use Tax we will pay the tax due direct to proper taxing authority when state law so provides or inform the seller for added tax billing. This certificate shall be part of each order which we may hereafter give to you, unless otherwise specified, and shall be called until canceled by us in writing or revoked by the city or state.

General Description of products to be purchased from seller

Under penalties of perjury, I swear or affirm that the information on this form is true and correct as to every material matter.

Authorized Signature *(owner, Partner or Corporate Officer)*	Title	Date (MM/DD/YY)
Robert C Kuehn	Associate Vice President/University Controller	9/4/18

FINANCE DEPARTMENT

Administration
1470 South Havana Street
Aurora, Colorado 80012
303-739-7055
FAX: 303-739-7068

March 12, 2001

Wayne F. Henderson
Vice Chancellor for Administration and Finance
University of Colorado Health Sciences Center
Fitzsimons, Building 500, Room C1003
P.O. Box 6508
Aurora, Colorado 80045-0508

RE: Letter of Commitment

Dear Mr. Henderson:

I am in receipt of your letter dated February 27, 2001, requesting that I issue a letter of commitment to the University of Colorado Health Sciences Center ("UCHSC") pursuant to *City Code Section 130-63(c)*. It is my understanding that UCHSC is part and parcel of the University of Colorado, a public institution of higher education of the State of Colorado. *§ 23-20-101, et seq., C.R.S.* You have asked for some assurance that UCHSC is exempt from the payment of City sales and use tax, as well as the employer portion of the City occupational privilege tax.

City Code Section 130-157(1) exempts all sales of tangible personal property and taxable services to the various political subdivisions of this state from imposition of City sales tax. Identical exemptions exist in both the City Use Tax ordinance (*City Code § 130-198(5)*) and the City Employer Occupational Privilege Tax ordinance (*City Code § 130-405(1)*). Accordingly, UCHSC falls squarely within each of these three exemptions.

It should be noted, however, that these exemptions do not extend to the collection of City tax. For instance, UCHSC must collect, report, and remit City sales tax on any retail sale of tangible personal property or taxable services it makes to a non-exempt third party. *City Code § 130-160.* Likewise, UCHSC

must also collect, report, and remit the employee portion of the City occupational privilege tax for each person it employs within the City for any period of time within a calendar month sufficient to receive no less than $250.00 as compensation for such employment. *City Code § 130-464.*

With respect to the deposit and ultimate payment of City use tax on construction materials, it is the longstanding policy of the City that the party who contracts for and directs and controls the construction of building improvements is liable for such tax. *See Fifteenth Street Investment Co. v. People, 102 Colo. 571, 81 P.2d 764 (1938).* Under the circumstances described in your request, it is UCHSC, and not its contractors, upon whom sole liability for the payment of City use tax would rest. Because UCHSC is an exempt entity, no use tax is due and owing on the purchase and subsequent use of construction materials for the development of UCHSC's property at the Fitzsimons site.

With regard to your additional requests, the City has no objection if UCHSC's contractors wish to use this letter to present to City building officials and third-party retailers as evidence of UCHSC's tax exemption. As for any future revocation of this letter, unless the status of UCHSC as a political subdivision changes, the various City tax exemptions which UCHSC is entitled to claim cannot be lawfully repealed without the prior approval of the City's voters. *See Colo. Const. Art. X, § 20(4)(a).* Therefore, the City believes UCHSC will be adequately informed in the event that the City decides to seek approval for any change in its tax laws that would impact UCHSC's tax-exempt status.

Very truly yours,

John Gross
Director of Finance

Department of Finance
Treasury Division
Tax Compliance – Audit Unit

201 W Colfax Ave #1009
Denver, CO 80202
fax: 720- 913-9455
www.denvergov.org/treasury

DENVER
THE MILE HIGH CITY

February 19, 2014

University of Colorado
Procurement Service Center
1800 Grant Street, Suite 500
Denver, CO 80203

Ladies/Gentlemen:

The above named entity is exempt from the Denver sales tax per Sec. 53-26(1) of the City Retail Sales Tax Article:

Sec. 53-26 (1) Exemptions

There shall be exempt from taxation under the provisions of this Article the following: (1) All sales to the United States Government, to the State, its departments and institutions and the political subdivisions thereof, only when purchased in their governmental capacities.

To qualify for the exemption, purchases must be billed direct to the organization, and payment made from funds of the organization.

The exemption does not extend to construction contractors who may perform contracts for you; they are the consumer of all property purchased and used in the performance or contracts for others. Nor does the exemption apply to purchases by employees or members for their own personal use.

You may reproduce this letter to furnish to suppliers as needed.

Sincerely,

Donald Korte, Audit Manager
Tax Compliance/Audit Section
720-913-9339

STATE OF COLORADO

TAXPAYER SERVICE DIVISION
Department of Revenue

1375 Sherman Street
Denver, Colorado 80261

Bill Owens
Governor

M. Michael Cooke
Executive Director

Neil Tillquist
Division Director

Michael J. Barden
University of Colorado at Denver and Health Sciences Center(UCDHSC)
Building 500, Mail Stop F418
P.O. Box 6508
Aurora CO 80045

April 7, 2006

Dear Mr. Barden:

This is in response to your letter of March 1, 2006, to Bruce Nelson of the Department of Revenue regarding sales tax exemption from county and special district sales taxes for UCDHSC construction projects at the Fitzsimons campus. Mr. Nelson has left the Department, so I am responding to your inquiry.

In regards to Adams County sales and use tax, the sales tax is collected by the Department of Revenue, not the city of Aurora. Use tax on building materials is collected by the county when issuing building permits. Under 29-2-105(d), 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., UCDHSC and its contractors and sub-contractors are exempt from county sales and use tax on construction and building materials for State/UCDHSC owned real property.

In regards to special district sales and use taxes, UCDHSC and its contractors and sub-contractors are exempt from sales and use tax pursuant to the exemptions granted in 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., for the Regional Transportation District under 32-9-119(2)(c)(II), C.R.S, for the Scientific and Cultural District under 32-13-107(2), C.R.S, and for the Metropolitan Football Stadium District under 32-15-110(2)(a), C.R.S.

Additionally, for construction projects in the City and County of Denver, UCDHSC and its contractors and sub-contractors are exempt from the aforementioned special district sales and use taxes, as well as state sales and use tax.

Should you have additional questions regarding these matters, feel free to contact me.

Respectfully,

Steve Asbell

Steve Asbell
Taxpayer Service Policy Group
Colorado Dept of Revenue
Ph:303.866.3889 email: sasbell@spike.dor.state.co.us

DO NOT SEND

DR 0172 (05/01/18)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261 - 0009
(303) 238-SERV (7378)

Special Notice

Purpose of this application

The exemption certificate for which you are applying must be used only for the purpose of purchasing construction and building materials for the exempt project described below. This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works **owned** and **used** by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law.

A separate certificate is required for each project.

Colorado Withholding Account Number

A Colorado Account Number (CAN) should be provided in this field. Applications that are left blank or list N/A will not be processed and will be returned.

Subsidiary:
This box is marked when a subsidiary is using the parents withholding account number (only when it does not have its own.) Provide the parents CAN.

Subcontractor:
This box is marked when a contractor does not have employees of their own and outsources their employees through a subcontractor. List the subcontractor or subcontractors name and CAN(s).

Staffing Agency:
This box is marked when a contractor does not have employees of their own and outsources their employees through a staffing agency. Provide the Staffing Agency's name and CAN.

No employees/no subcontractors:
For contractors with no employees, no subcontractors/ staffing agencies:

Write no employees in the (CAN) box and provide explanation. For example, I have no employees or subcontractors and perform all of the work myself.

Subcontractors:
Subcontractors will not be issued Certificates of Exemption by the Department of Revenue. Upon receipt of the Certificate, the prime contractor should make a copy for each subcontractor involved in the project and complete it by filling in the subcontractor's name and address and signing it. The original Certificate should always be retained by the prime contractor. Copies of all Certificates that the prime contractor issued to subcontractors should be kept at the prime contractor's place of business for a minimum of three years and be available for inspection in the event of an audit.

See FYI Sales 95 for information about qualifying affordable housing projects.

To avoid a returned application ensure you have done the following:

- ☐ Accurately completed all applicable boxes of the form.
- ☐ Provided a copy of the Contract or agreement page. The Contract or Agreement page lists the type and scope of work.
- ☐ Bid amount on Contract or Agreement page matches the amount listed on the application (to the penny).
- ☐ Contract or Agreement page contains the signatures of the contracting parties.
- ☐ The form DR0172 (application) is signed.
- ☐ The exempt organizations number was provided and is correct.

140172 19999

DR 0172 (05/01/18)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261 - 0009
(303) 238-SERV (7378)

Contractor Application for Exemption Certificate

This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works **owned** and **used** by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law. A separate certificate is required for each contract.

Send completed forms to: Colorado Department of Revenue, Denver, CO 80261-0009
Failure to accurately complete all boxes of the form or provide all supporting documentation will cause the application to be denied.

For Department Use Only. Do not write in this section.

Contractor/Account No.	Period (MM/YY-MM/YY)
89-	

Must be completed by applicant

Contractor Information

Trade name/DBA

Owner, partner or corporate last name	First Name	Middle Initial

Mailing Address	City	State	Zip

E-Mail Address	FEIN	Bid amount for your contract (Must match to the penny)
		$

Fax number	Business Phone number

Colorado withholding tax account number (See instructions)

☐ Subsidiary ☐ Subcontractors ☐ Staffing Agency
☐ No employees/subcontractors (see below)

No Employees/Subcontractors. (Provide explanation or attach a letter of explanation).

Exemption Information

Copies of contract or agreement page, identifying the contracting parties, bid amount, type of work, and signatures of contracting parties **must** be attached

Name of exempt organization (as show on contract)	Exempt organization's number
	98

Address of exempt organization	City	State	Zip

Principal contact at exempt organization-Last Name	First Name	Middle Initial

Housing Authority (if applicable)	Name of Project (if applicable)

Owner of the Project (if applicable)

Physical location of project site (give actual address when applicable and Cities and/or County (ies) where project is located)

City	State	Zip	Principal contact's telephone number

Scheduled construction start date (MM/DD/YY)	Estimated completion date (MM/DD/YY)

I declare under penalty of perjury in the second degree that the statements made in this application are true and complete to the best of my knowledge.

Signature of the business owner, partner or corporate officer	Title of corporate officer	Date (MM/DD/YY)

STATE OF COLORADO
CONTRACTOR'S AGREEMENT DESIGN/BID/BUILD
(STATE FORM SC-6.21)

EXHIBIT H

SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS AND MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONTRACTOR'S DESIGN/BID/BUILD (D/B/B) AGREEMENT

(STATE FORM SC-6.23)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.23)

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STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONTRACTOR'S DESIGN/BID/BUILD AGREEMENT
(STATE FORM SC-6.23)

ARTICLE 1. DEFINITIONS

A. CONTRACT DOCUMENTS

The Contract Documents consist of the following some of which are procedural documents used in the administration and performance of the Agreement:

1. Contractor's Design/Bid/Build Agreement; (SC-6.21);
2. Performance Bond (SC-6.22) and Labor and Material Payment Bond (SC-6.221);
3. General Conditions of the Contractor's Design/Bid/Build Agreement (SC- 6.23) and if applicable, Supplementary General Conditions;
4. Detailed Specification Requirements, including all addenda issued prior to the opening of the bids; and,
5. Drawings, including all addenda issued prior to the opening of the bids.
6. Change Orders (SC-6.31) and Amendments (SC-6.0), if any, when properly executed.
7. Authorization to Bid (SBP-6.10)
8. Information for Bidders (SBP-6.12);
9. Bid (SBP-6.13);
10. Bid Bond (SBP-6.14);
11. Notice of Award (SBP-6.15);
12. Builder's risk insurance certificates of insurance (ACORD 25-S);
13. Liability and Workers' compensation certificates of insurance;
14. Notice to Proceed (Design/Bid/Build) (SBP-6.26);
15. Notice of Approval of Occupancy/Use (SBP-01);
16. Notice of Partial Substantial Completion (SBP-071);
17. Notice of Substantial Completion (SBP-07);
18. Notice of Partial Final Acceptance (SC-6.27);
19. Notice of Final Acceptance (SBP-6.271);
20. Notice of Partial Contractor's Settlement (SC-7.3);
21. Notice of Contractor's Settlement (SBP-7.31);
22. Application and Certificate for Contractor's Payment (SBP-7.2);
23. Other procedural and reporting documents or forms referred to in the General Conditions, the Supplementary General Conditions, the Specifications or required by the State Buildings Program or the Principal Representative, including but not necessarily limited to Pre-Acceptance Check List (SBP-05) and the Building Inspection Record (SBP-BIR). A list of the current standard State Buildings Program forms applicable to this Contract may be obtained from the Principal Representative on request.

B. DEFINITIONS OF WORDS AND TERMS USED

1. AGREEMENT. The term "Agreement" shall mean the written agreement entered into by the State of Colorado acting by and through the Principal Representative and the Contractor for the performance of the Work and payment therefore, on State Form SC-6.21. The term Agreement when used without reference to State Form SC-6.21 may also refer to the entirety of the parties' agreement to perform the Work described in the Contract Documents or reasonably inferable there from. The term "Contract" shall be interchangeable with this latter meaning of the term Agreement
2. ARCHITECT/ENGINEER. The term "Architect/Engineer" shall mean either the architect of record or the engineer of record under contract to the State of Colorado for the Project identified in the Contract Documents.

3. CHANGE ORDER. The term “Change Order” means a written order directing the Contractor to make changes in the Work, in accordance with Article 35A, The Value of Changed Work.
4. COLORADO LABOR. The term “Colorado labor”, as provided in C.R.S. § 8-17-101(2)(a), as amended, means any person who is a resident of the state of Colorado, at the time of the public Works project, without discrimination as to race, color, creed, sex, sexual orientation, marital status, national origin, ancestry, age, or religion except when sex or age is a bona fide occupational qualification. A resident of the state of Colorado is a person who can provide a valid Colorado driver’s license, a valid Colorado state-issued photo identification, or documentation that he or she has resided in Colorado for the last thirty days.
5. CONTRACTOR. The word “Contractor” shall mean the person, company, firm, corporation or other legal entity entering into a contract with the State of Colorado acting by and through the Principal Representative
6. DAYS. The term “days” whether singular or plural shall mean calendar days unless expressly stated otherwise. Where the term “business days” is used it shall mean business days of the State of Colorado.
7. DRAWINGS. The term “Drawings” shall mean all drawings approved by appropriate State officials which have been prepared by the Architect/Engineer showing the Work to be done, except that where a list of drawings is specifically enumerated in the Supplementary General Conditions or division 1 of the Specifications, the term shall mean the drawings so enumerated, including all addenda drawings.
8. EMERGENCY FIELD CHANGE ORDER. The term “Emergency Field Change Order” shall mean a written change order for extra Work or a change in the Work necessitated by an emergency as defined in Article 35D executed on State form SC 6.31 and identified as an Emergency Field Change Order. The use of such orders is limited to emergencies and to the amounts shown in Article 35D.
9. FINAL ACCEPTANCE. The terms “final acceptance” or “finally complete” mean the stage in the progress of the Work, after substantial completion, when all remaining items of Work have been completed, all requirements of the Contract Documents are satisfied and the Notice of Acceptance can be issued. Discrete physical portions of the Project may be separately and partially deemed finally complete at the discretion of the Principal Representative when that portion of the Project reaches such stage of completion and a partial Notice of Acceptance can be issued.
10. FIXED LIMIT OF CONSTRUCTION COST. The term “Fixed Limit of Construction Cost” shall set forth a dollar amount available for the total Construction Cost of all elements of the Work as specified by the Principal Representative.
11. NOTICE. The term “Notice” shall mean any communication <u>in writing</u> from either contracting party to the other by such means of delivery that receipt cannot properly be denied. Notice shall be provided to the person identified to receive it in Article 7.5 (Contractor’s Design/Bid/Build Agreement SC-6.21), Notice Identification, or to such other person as either party identifies in writing to receive Notice. Notice by facsimile transmission where proper transmission is evidence shall be adequate where facsimile numbers are included in Article 7.5 (Contractor’s Design/Bid/Build Agreement SC-6.21). Notwithstanding an email delivery or return receipt, email Notice shall not be adequate. Acknowledgment of receipt of a voice message shall not be deemed to waive the requirement that Notice, where required, shall be in writing.
12. OCCUPANCY. The term “Occupancy” means occupancy taken by the State as Owner after the Date of Substantial Completion at a time when a building or other discrete physical portion of the Project is used for the purpose intended. The Date of Occupancy shall be the date of such first use, but shall not be prior to the date of execution of the Notice of Approval of Occupancy/Use. Prior to the date of execution of a Notice of Approval of Occupancy/Use, the state shall have no right to occupy and the project may not be considered safe for occupancy for the intended use.

13. OWNER. The term “Owner” shall mean the Principal Representative.
14. PRINCIPAL REPRESENTATIVE. The term “Principal Representative ” shall be defined, as provided in § 24-30-1301(11), C.R.S., as the governing board of a state department, institution, or agency; or if there is no governing board, then the executive head of a state department, institution, or agency, as designated by the governor or the general assembly and as specifically identified in the Contract Documents, or shall have such other meaning as the term may otherwise be given in § 24-30-1301(11), C.R.S., as amended. The Principal Representative may delegate authority. The Contractor shall have the right to inquire regarding the delegated authority of any of the Principal Representative’s representatives on the project and shall be provided with a response in writing when requested.
15. PRODUCT DATA. The term “Product Data ” shall mean all submittals in the form of printed manufacturer’s literature, manufacturer’s specifications, and catalog cuts.
16. PROJECT. The "Project" is the total construction of which the Work performed under the Contract Documents is a part, and may include construction by the Principal Representative or by separate contractors.
17. REASONABLY INFERABLE. The phrase “reasonably inferable” means that if an item or system is either shown or specified, all material and equipment normally furnished with such items or systems and needed to make a complete installation shall be provided whether mentioned or not, omitting only such parts as are specifically excepted, and shall include only components which the Contractor could reasonably anticipate based on his or her skill and knowledge using an objective, industry standard, not a subjective standard. This term takes into consideration the normal understanding that not every detail is to be given on the Drawings and Specifications If there is a difference of opinion, the Principal Representative shall make the determination as to the standards of what reasonably inferable.
18. SAMPLES. The term “Samples” shall mean examples of materials or Work provided to establish the standard by which the Work will be judged.
19. SBP. The term "SBP" means "State Buildings", which is used in connection with labeling applicable State form documents (e.g., "SBP-01" is the form number for Notice of Approval of Occupancy/Use).
20. SC. The term "SC" means "State Contract" which is used in connection with labeling applicable State form documents (e.g. "SC 6.23" is the State form number for these General Conditions of the Contractor’s Design/Bid/Build Agreement).
21. SCHEDULE OF VALUES. The term “Schedule of Values” is defined as the itemized listing of description of the Work by Division and Section of the Specifications. The format shall be the same as Form SC-7.2. Included shall be the material costs, and the labor and other costs plus the sum of both.
22. SHOP DRAWINGS. The term “Shop Drawings” shall mean any and all detailed drawings prepared and submitted by Contractor, Subcontractor at any tier, vendors or manufacturers providing the products and equipment specified on the Drawings or called for in the Specifications.
23. SPECIFICATIONS. The term “Specifications” shall mean the requirements of the CSI divisions of the project manual prepared by the Architect/Engineer describing the Work to be accomplished.
24. STATE BUILDINGS PROGRAM. Shall refer to the Office of the State Architect within the Department of Personnel & Administration of Colorado State government responsible for project administration, review, approval and coordination of plans, construction procurement policy, contractual procedures, and code compliance and inspection of all buildings, public Works and improvements erected for state purposes; except public roads and highways and projects under the supervision of the division of wildlife and the division of parks and outdoor recreation as provided in § 24-30-1301, *et seq*, C.R.S. The term State Buildings Program shall also mean that individual within a State Department agency or institution, including institutions of higher education, who has signed an agreement accepting delegation to perform all or part of the responsibilities and functions of State Buildings Program.
25. SUBCONTRACTOR. The term “Subcontractor” shall mean a person, firm or corporation supplying labor, materials, equipment and/or Services for Work at the site of the Project for, and under separate contract or agreement with the Contractor.
26. SUBMITTALS. The term “submittals” means drawings, lists, tables, documents and samples prepared by the Contractor to facilitate the progress of the Work as required by these General

Conditions or the Drawings and Specifications. They consist of Shop Drawings, Product Data, Samples, and various administrative support documents including but not limited to lists of subcontractors, construction progress schedules, schedules of values, applications for payment, inspection and test results, requests for information, various document logs, and as-built drawings. Submittals are r*equired* by the Contract Documents, but except to the extent expressly specified otherwise are not themselves a part of the Contract Documents.

27. SUBSTANTIAL COMPLETION. The terms “substantial completion” or “substantially complete” mean the stage in the progress of the Work when the construction is sufficiently complete, in accordance with the Contract Documents as modified by any Change Orders, so that the Work, or at the discretion of the Principal Representative, any designated portion thereof, is available for its intended use by the Principal Representative and a Notice of Substantial Completion can be issued. Portions of the Project may, at the discretion of the Principal Representative, be designated as substantially complete.
28. SUPPLIER. The term "Supplier" shall mean any manufacturer, fabricator, distributor, material man or vendor.
29. SURETY. The term “Surety” shall mean the company providing the labor and material payment and performance bonds for the Contractor as obligor.
30. VALUE ENGINEERING. “Value Engineering” or “VE” is defined as an analysis and comparison of cost versus value of building materials, equipment, and systems. VE considers the initial cost of construction, coupled with the estimated cost of maintenance, energy use, life expectancy and replacement cost. VE related to this Project shall include the analysis and comparison of building elements in an effort to reduce overall Project costs, while maintaining or enhancing the quality of the design intent, whenever possible.
31. WORK. The term “Work” shall mean all or part of the labor, materials, equipment, and other services required by the Contract Documents or otherwise required to be provided by the Contractor to meet the Contractor’s obligations under the Contract.

ARTICLE 2. EXECUTION, CORRELATION, INTENT OF DOCUMENTS, COMMUNICATION AND COOPERATION

A. EXECUTION

The Contractor, within ten (10) days from the date of Notice of Award, will be required to:

1. Execute the Agreement, State Form SC-6.21;
2. Furnish fully executed Performance and Labor and Material Payment Bonds on State Form s SC-6.22 and SC-6.221; and
3. Furnish certificates of insurance evidencing all required insurance on standard Acord forms designed for such purpose.
4. Furnish certified copies of any insurance policies requested by the Principal Representative.

B. CORRELATION

By execution of the Agreement the Contractor represents that the Contractor has visited the site, has become familiar with local conditions and local requirements under which the Work is to be performed, including the building code programs of the State Buildings Program as implemented by the Principal Representative, and has correlated personal observations with the requirements of the Contract Documents.

C. INTENT OF DOCUMENTS

The Contract Documents are complementary, and what is called for by any one document shall be as binding as if called for by all. The intention of the documents is to include all labor, materials, equipment and transportation necessary for the proper execution of the Work. Words describing materials or Work which have a well-known technical or trade meaning shall be held to refer to such recognized standards.

In any event, if any error exists, or appears to exist, in the requirements of the Drawings or Specifications, or if any disagreement exists as to such requirements, the Contractor shall have the same explained or adjusted by the Architect/Engineer before proceeding with the Work in question. In the event of the Contractor’s failure to give prior written Notice of any such errors or disagreements of which the Contractor or the Subcontractors at any tier are aware, the Contractor shall, at no additional

cost to the Principal Representative, make good any damage to, or defect in, Work which is caused by such omission.

Where a conflict occurs between or within standards, Specifications or Drawings, which is not resolved by reference to the precedence between the Contract Documents, the more stringent or higher quality requirements shall apply so long as such more stringent or higher quality requirements are reasonably inferable. The Architect/Engineer shall decide which requirements will provide the best installation.

With the exception noted in the following paragraph, the precedence of the Contract Documents is in the following sequence:

1. The Agreement (SC-6.21);
2. The Supplementary General Conditions, if any;
3. The General Conditions (SC-6.23); and
4. Drawings and Specifications, all as modified by any addenda.

Change Orders and Amendments, if any, to the Contract Documents take precedence over the original Contract Documents.

Notwithstanding the foregoing order of precedence, the Special Provisions of Article 52 of the General Conditions, Special Provisions, shall take precedence, rule and control over all other provisions of the Contract Documents.

Unless the context otherwise requires, form numbers in this document are for convenience only. In the event of any conflict between the form required by name or context and the form required by number, the form required by name or context shall control. The Contractor may obtain State forms from the Principal Representative upon request.

D. PARTNERING, COMMUNICATIONS AND COOPERATION

In recognition of the fact that conflicts, disagreements and disputes often arise during the performance of construction contracts, the Contractor and the Principal Representative aspire to encourage a relationship of open communication and cooperation between the employees and personnel of both, in which the objectives of the Contract may be better achieved and issues resolved in a more fully informed atmosphere.

The Contractor and the Principal Representative each agree to assign an individual who shall be fully authorized to negotiate and implement a voluntary partnering plan for the purpose of facilitating open communications between them. Within thirty days (30) of the Notice to Proceed, the assigned individuals shall meet to discuss development of an informal agreement to accomplish these goals.

The assigned individuals shall endeavor to reach an informal agreement, but shall have no such obligation. Any plans these parties voluntarily agree to implement shall result in no change to the contract amount, and no costs associated with such plan or its development shall be recoverable under any contract clause. In addition, no plan developed to facilitate open communication and cooperation shall alter, amend or waive any of the rights or duties of either party under the Contract unless and except by written Amendment to the Contract, nor shall anything in this clause or any subsequently developed partnering plan be deemed to create fiduciary duties between the parties unless expressly agreed in a written Amendment to the Contract. It is also recognized that projects with relatively low contract values may not justify the expense or special efforts required. In the case of small projects with an initial Contract value under $500,000, the requirements of the preceding paragraph shall not apply.

ARTICLE 3. COPIES FURNISHED

The Contractor will be furnished, free of charge, the number of copies of Drawings and Specifications as specified in the Contract Documents, or if no number is specified, all copies reasonably necessary for the execution of the Work.

ARTICLE 4. OWNERSHIP OF DRAWINGS

Drawings or Specifications, or copies of either, furnished by the Architect/Engineer, are not to be used on any other Work. At the completion of the Work, at the written request of the Architect/Engineer, the Contractor shall endeavor to return all Drawings and Specifications.

The Contractor may retain the Contractor's Contract Document set, copies of Drawings and Specifications used to contract with others for any portion of the Work and a marked up set of as-built drawings.

ARTICLE 5. ARCHITECT/ENGINEER'S STATUS

The Architect/Engineer is the representative of the Principal Representative for purposes of administration of the Contract, as provided in the Contract Documents and the Agreement. In case of termination of employment or the death of the Architect/Engineer, the Principal Representative will appoint a capable Architect/Engineer against whom the Contractor makes no reasonable objection, whose status under the Contract shall be the same as that of the former Architect/Engineer.

ARTICLE 6. ARCHITECT/ENGINEER DECISIONS AND JUDGMENTS, ACCESS TO WORK AND INSPECTION

A. DECISIONS

The Architect/Engineer shall, within a reasonable time, make decisions on all matters relating to the execution and progress of the Work or the interpretation of the Contract Documents, and in the exercise of due diligence shall be reasonably available to the Contractor to timely interpret and make decisions with respect to questions relating to the design or concerning the Contract Documents.

B. JUDGMENTS

The Architect/Engineer is, in the first instance, the judge of the performance required by the Contract Documents as it relates to compliance with the Drawings and Specifications and quality of Workmanship and materials.

The Architect/Engineer shall make judgments regarding whether directed Work is extra or outside the scope of Work required by the Contract Documents at the time such direction is first given. If, in the Contractor's judgment, any performance directed by the Architect/Engineer is not required by the Contract Documents or if the Architect/Engineer does not make the judgment required, it shall be a condition precedent to the filing of any claim for additional cost related to such directed Work that the Contractor, before performing such Work, shall first obtain in writing, the Architect/Engineer's written decision that such directed Work is included in the performance required by the Contract Documents. If the Architect/Engineer's direction to perform the Work does not state that the Work is within the performance required by the Contract Documents, the Contractor shall, in writing, request the Architect/Engineer to advise in writing whether the directed Work will be considered extra Work or Work included in the performance required by the Contract Documents.

The Architect/Engineer shall respond to any such written request for such a decision within three (3) business days and if no response is provided, or if the Architect/Engineer's written decision is to the effect that the Work is included in the performance required by the Contract Documents, the Contractor may file with the Principal Representative and the Architect/Engineer a Notice of claim in accordance with Article 36, Claims. Whether or not a Notice of claim is filed, the Contractor shall proceed with the ordered Work. Disagreement with the decision of the Architect/Engineer shall not be grounds for the Contractor to refuse to perform the Work directed or to suspend or terminate performance.

C. ACCESS TO WORK

The Architect/Engineer, the Principal Representative and representatives of State Buildings Program shall at all times have access to the Work. The Contractor shall provide proper facilities for such access and for their observations or inspection of the Work.

D. INSPECTION

The Architect/Engineer has agreed to make, or that structural, mechanical, electrical engineers or other consultants will make, periodic visits to the site to generally observe the progress and quality of the

Work to determine in general if the Work is proceeding in accordance with the Contract Documents. Observation may extend to all or any part of the Work and to the preparation, fabrication or manufacture of materials.

Without in any way meaning to be exclusive or to limit the responsibilities of the Architect/Engineer or the Contractor, the Architect/Engineer has agreed to observe, among other aspects of the Work, the following for compliance with the Contract Documents:

1. Compaction testing reports based upon the findings and recommendations of the Principal Representative's testing consultant;
2. Bearing surfaces of excavations before concrete is placed based upon the findings and recommendations of the Principal Representative's soils engineering consultant;
2. Reinforcing steel after installation and before concrete is poured;
3. Structural concrete;
4. Laboratory reports on all concrete testing based upon the findings and recommendations of the Principal Representative's testing consultant;
5. Structural steel during and after erection and prior to its being covered or enclosed;
6. Steel welding; Principal Representative will furnish steel welding inspection consultant/agency if required or necessary for the project;
7. Mechanical and plumbing Work following its installation and prior to its being covered or enclosed;
8. Electrical Work following its installation and prior to its being covered or enclosed; and
9. Any special or quality control testing required in the Contract Documents provided by the Principal Representative's testing consultant.

If the Specifications, the Architect/Engineer's instructions, laws, ordinances of any public authority require any Work to be specifically tested or approved, the Contractor shall give the Principal Representative, Architect/Engineer and appropriate testing agency (if necessary) timely notice of its readiness for observation by the Architect/Engineer or inspection by another authority, and if the inspection is by another authority, of the date fixed for such inspection, required certificates of inspection being secured by the Contractor. The Contractor shall give all required Notices to the Principal Representative or his or her designee for inspections required for the building inspection program. It shall be the responsibility of the Contractor to determine the Notice required by the State pursuant to Building Inspection Record for the Project, according to State form SBP-B.I.R., or the equivalent form required by the Principal Representative as approved by the State Buildings Program. If any such Work is covered up without approval or consent of the Architect/Engineer or prior to any building code inspection, it must, if required by the Architect/Engineer, the Principal Representative or the State Buildings Program, be uncovered for examination, at the Contractor's expense. If such Work is found to be not in accordance with the Contract Documents, the Contractor shall pay such costs, unless he or she shall show that the defect in the Work was caused by another contractor engaged by the Principal Representative. In addition, examination of questioned Work may be ordered, and if so ordered, the Work must be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the Contractor shall be reimbursed the cost of examination and replacement.

ARTICLE 7. CONTRACTOR'S SUPERINTENDENCE AND SUPERVISION

The Contractor shall employ, and keep present (as applicable) on the Project during its progress, a competent project manager as satisfactory to the Principal Representative. The project manager shall not be changed except with the consent of the Principal Representative, unless the project manager proves to be unsatisfactory to the Contractor and ceases to be in his or her employ. The project manager shall represent the Contractor for the Project, and in the absence of the Contractor, all directions given to the project manager shall be as binding as if given to the Contractor. Directions received by the project manager shall be documented by the project manager and communicated in writing with the Contractor.

The Contractor shall employ, and keep present on the Project during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Architect/Engineer and the Principal Representative. The superintendent shall not be changed except with the consent of the Architect/Engineer and the Principal

Representative, unless the superintendent proves to be unsatisfactory to the Project Manager/Contractor and ceases to be in his or her employ. The superintendent shall represent the Project Manager/Contractor in his or her absence and all directions given to the superintendent shall be as binding as if given to the Project Manager/Contractor. Directions received by the superintendent shall be documented by the superintendent and confirmed in writing with the Project Manager/Contractor.

The Contractor shall give efficient supervision to the Work, using his or her best skill and attention. He or she shall carefully study and compare all Drawings, Specifications and other written instructions and shall without delay report any error, inconsistency or omission which he or she may discover in writing to the Architect/Engineer. The Contractor shall not be liable to the Principal Representative for damage to the extent it results from errors or deficiencies in the Contract Documents or other instructions by the Architect/Engineer, unless the Contractor knew or had reason to know, that damage would result by proceeding and the Contractor fails to so advise the Architect/Engineer.

The superintendent shall see that the Work is carried out in accordance with the Contract Documents and in a uniform, thorough and first-class manner in every respect. The Contractor's superintendent shall establish all lines, levels, and marks necessary to facilitate the operations of all concerned in the Contractor's Work. The Contractor shall lay out all Work in a manner satisfactory to the Architect/Engineer, making permanent records of all lines and levels required for excavation, grading, foundations, and for all other parts of the Work.

ARTICLE 8. MATERIALS AND EMPLOYEES

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and other facilities necessary for the execution and completion of the Work.

Unless otherwise specified, all materials shall be new and both workmanship and materials shall be first class and of uniform quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor is fully responsible for all acts and omissions of the Contractor's employees and shall at all times enforce strict discipline and good order among employees on the site. The Contractor shall not employ on the Work any person reasonably deemed unfit by the Principal Representative or anyone not skilled in the Work assigned to him.

ARTICLE 9. SURVEYS, PERMITS, LAWS, TAXES AND REGULATIONS

A. SURVEYS

The Principal Representative shall furnish all surveys, property lines and bench marks deemed necessary by the Architect/Engineer, unless otherwise specified.

B. PERMITS AND LICENSES

Permits and licenses necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Unless otherwise specified in the Specifications, no local municipal or county building permit shall be required. However, State Buildings Program requires each Principal Representative to administer a building code inspection program, the implementation of which may vary at each agency or institution of the State. The Contractors' employees shall become personally familiar with these local conditions and requirements and shall fully comply with such requirements. State electrical and plumbing permits are required, unless the requirement to obtain such permits is altered by State Building's Programs. The Contractor shall obtain and pay for such permits.

Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Principal Representative, unless otherwise specified.

C. TAXES

1. Refund of Sales and Use Taxes

The Contractor shall pay all local taxes required to be paid, including but not necessarily limited to all sales and use taxes. If requested by the Principal Representative prior to issuance of the

Notice to Proceed or directed in the Supplementary General Conditions or the Specifications, the Contractor shall maintain records of such payments in respect to the Work, which shall be separate and distinct from all other records maintained by the Contractor, and the Contractor shall furnish such data as may be necessary to enable the State of Colorado, acting by and through the Principal Representative, to obtain any refunds of such taxes which may be available under the laws, ordinances, rules or regulations applicable to such taxes. When so requested or directed, the Contractor shall require Subcontractors at all tiers to pay all local sales and use taxes required to be paid and to maintain records and furnish the Contractor with such data as may be necessary to obtain refunds of the taxes paid by such Subcontractors. No State sales and use taxes are to be paid on material to be used in this Project. On application by the purchaser or seller, the Department of Revenue shall issue to a Contractor or to a Subcontractor at any tier, a certificate or certificates of exemption per § 39-26-703(2)(b), C.R.S., and § 39-26-708, C.R.S.

2. Federal Taxes
The Contractor shall exclude the amount of any applicable federal excise or manufacturers' taxes from the proposal. The Principal Representative will furnish the Contractor, on request exemption certificates.

D. LAWS AND REGULATIONS
The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn or specified. If the Contractor observes that the Drawings or Specifications require Work which is at variance therewith, the Contractor shall without delay notify the Architect/Engineer in writing and any necessary changes shall be adjusted as provided in Article 35, Changes In The Work.

The Contractor shall bear all costs arising from the performance of Work required by the Drawings or Specifications that the Contractor knows to be contrary to such laws, ordinances, rules or regulations, if such Work is performed without giving Notice to the Architect/Engineer.

ARTICLE 10. PROTECTION OF WORK AND PROPERTY

A. GENERAL PROVISIONS
The Contractor shall continuously maintain adequate protection of all Work and materials, protect the property from injury or loss arising in connection with this Contract and adequately protect adjacent property as provided by law and the Contract Documents. The Contractor shall make good any damage, injury or loss, except to the extent:

1. Directly due to errors in the Contract Documents;
2. Caused by agents or employees of the Principal Representative; and,
3. Due to causes beyond the Contractor's control and not to fault or negligence; provided such damage, injury or loss would not be covered by the insurance required to be carried by the Contractor;

B. SAFETY PRECAUTIONS
The Contractor shall take all necessary precautions for the safety of employees on the Project, and shall comply with all applicable provisions of federal, State and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. He or she shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for the protection of Workers and the public and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways and falling materials; and he or she shall designate a responsible member of his or her organization on the Project, whose duty shall be the prevention of accidents. The name and position of any person so designated shall be reported to the Architect/Engineer by the Contractor.

The Contractor shall provide all necessary bracing, shoring and tying of all structures, decks and framing to prevent any structural failure of any material which could result in damage to property or the injury or death of persons; take all precautions to insure that no part of any structure of any description is loaded beyond its carrying capacity with anything that will endanger its safety at any time during the execution of this Contract; and provide for the adequacy and safety of all scaffolding and hoisting equipment. The Contractor shall not permit open fires within the building enclosure. The Contractor shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations and floors, pits and trenches free of water. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work, except as otherwise noted.

The Contractor shall take due precautions when obstructing sidewalks, streets or other public ways in any manner, and shall provide, erect and maintain barricades, temporary walkways, roadways, trench covers, colored lights or danger signals and any other devices necessary or required to assure the safe passage of pedestrians and automobiles.

C. EMERGENCIES

In an emergency affecting the safety of life or of the Work or of adjoining property, the Contractor without special instruction or authorization from the Architect/Engineer or Principal Representative, is hereby permitted to act, at his or her discretion, to prevent such threatened loss or injury; and he or she shall so act, without appeal, if so authorized or instructed. Provided the Contractor has no responsibilities for the emergency, if the Contractor incurs additional cost not otherwise recoverable from insurance or others on account of any such emergency Work, the Contract sum shall be equitably adjusted in accordance with Article 35, Changes In The Work.

ARTICLE 11. DRAWINGS AND SPECIFICATIONS ON THE WORK

The Contractor shall keep on the job site one copy of the Contract Documents in good order, including current copies of all Drawings and Specifications for the Work, and any approved Shop Drawings, Product Data or Samples, and as-built drawings. As-built drawings shall be updated weekly by the Contractor and Subcontractors to reflect actual constructed conditions including dimensioned locations of underground Work and the Contractor's failure to maintain such updates may be grounds to withhold portions of payments otherwise due in accordance with Article 33, Payments Withheld. All such documents shall be available to the Architect/Engineer and representatives of the State. In addition, the Contractor shall keep on the job site one copy of all approved addenda, Change Orders and requests for information issued for the Work.

The Contractor shall develop procedures to insure the currency and accuracy of as-built drawings and shall maintain on a current basis a log of requests for information and responses thereto, a Shop Drawing and Product Data submittal log, and a Sample submittal log to record the status of all necessary and required submittals.

ARTICLE 12. REQUESTS FOR INFORMATION AND SCHEDULES

A. REQUESTS FOR INFORMATION

The Architect/Engineer shall furnish additional instructions with reasonable promptness, by means of drawings or otherwise, necessary for the proper execution of the Work. All such drawings and instructions shall be consistent with the Contract Documents and reasonably inferable there from. The Architect/Engineer shall determine what additional instructions or drawings are necessary for the proper execution of the Work.

The Work shall be executed in conformity with such instructions and the Contractor shall do no Work without proper drawings, specifications or instructions. If the Contractor believes additional instructions, specifications or drawings are needed for the performance of any portion of the Work, the Contractor shall give Notice of such need in writing through a request for information furnished to the Architect/Engineer sufficiently in advance of the need for such additional instructions, specifications or drawings to avoid delay and to allow the Architect/Engineer a reasonable time to respond. The Contractor shall maintain a log of the requests for information and the responses provided.

B. SCHEDULES

1. Submittal Schedules

Prior to filing the Contractor 's first application for payment, a schedule shall be prepared which may be preliminary to the extent required, fixing the dates for the submission and initial review of required Shop Drawings, Product Data and Samples for the beginning of manufacture and installation of materials, and for the completion of the various parts of the Work. It shall be prepared so as to cause no delay in the Work or in the Work of any other contractor. The schedule shall be subject to change from time to time in accordance with the progress of the Work, and it shall be subject to the review and approval by the Architect/Engineer. It shall fix the dates at which the various Shop Drawings Product Data and Samples will be required from the Architect/Engineer. The Architect/Engineer, after review and agreement as to the time provided for initial review, shall review and comment on the Shop Drawings, Product Data and Samples in accordance with that schedule. The schedule shall be finalized, prepared and submitted with respect to each of the elements of the Work in time to avoid delay, considering reasonable periods for review, manufacture or installation.

At the time the schedule is prepared, the Contractor, the Architect/Engineer and Principal Representative shall jointly identify the Shop Drawing, Product Data and Samples, if any, which the Principal Representative shall receive simultaneously with the Architect/Engineer for the purposes of owner coordination with existing facility standards and systems. The Contractor shall furnish a copy for the Principal Representative when so requested. Transmittal of Shop Drawings and Product Data copies to the Principal Representative shall be solely for the convenience of the Principal Representative and shall neither create nor imply responsibility or duty of review by the Principal Representative.

The Contractor may also, or at the direction of the Principal Representative at any time shall, prepare and maintain a schedule, which may also be preliminary and subject to change to the extent required, fixing the dates for the initial responses to requests for information or for detail drawings which will be required from the Architect/Engineer to allow the beginning of manufacture, installation of materials and for the completion of the various parts of the Work. The schedule shall be subject to review and approval by the Architect/Engineer. The Architect/Engineer shall, after review and agreement, furnish responses and detail drawings in accordance with that schedule. Any such schedule shall be prepared and approved in time to avoid delay, considering reasonable periods for review, manufacture or installation, but so long as the request for information schedule is being maintained, it shall not be deemed to transfer responsibility to the Contractor for errors or omissions in the Contract Documents where circumstances make timely review and performance impossible.

The Architect/Engineer shall not unreasonably withhold approval of the Contractor's schedules and shall inform the Contractor and the Principal Representative of the basis of any refusal to agree to the Contractor's schedules. The Principal Representative shall attempt to resolve any disagreements.

2. Schedule of Values

Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and Principal Representative, for approval, and to the State Buildings Program when specifically requested, a complete itemized schedule of the values of the various parts of the Work, as estimated by the Contractor, aggregating the total price. The schedule of values shall be in such detail as the Architect/Engineer or the Principal Representative shall require, prepared on forms acceptable to the Principal Representative. It shall, at a minimum, identify on a separate line each division of the Specifications including the general conditions costs to be charged to the Project. The Contractor shall revise and resubmit the schedule of values for approval when, in the opinion of the Architect/Engineer or the Principal

Representative, such resubmittal is required due to changes or modifications to the Contract Documents or the Contract sum.

The total cost of each line item so separately identified shall, when requested by the Architect/Engineer or the Principal Representative, be broken down into reasonable estimates of the value of:

a. Material, which shall include the cost of material actually built into the Project plus any local sales or use tax paid thereon; and,
b. Labor and other costs.

The cost of subcontracts shall be incorporated in the Contractor's schedule of values, and when requested by the Architect/Engineer or the Principal Representative, shall be separately shown as line items.

The Architect/Engineer shall review the proposed schedules and approve it after consultation with the Principal Representative, or advise the Contractor of any required revisions within ten (10) days of its receipt. In the event no action is taken on the submittal within ten days, the Contractor may utilize the schedule of values as its submittal for payment until it is approved or until revisions are requested.

When the Architect/Engineer deems it appropriate to facilitate certification of the amounts due to the Contractor, further breakdown of subcontracts, including breakdown by labor and materials, may be directed.

This schedule of values, when approved, will be used in preparing Contractor's applications for payment on State Form SC-7.2, Application for Payment.

3. Construction Schedules

Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and the Principal Representative, and to the State Buildings Program when specifically requested, on a form acceptable to them, an overall timetable of the construction schedule for the Project. Unless the Supplementary General Conditions or the Specifications allow scheduling with bar charts or other less sophisticated scheduling tools, the Contractor's schedule shall be a critical-path method (CPM) construction schedule. The CPM schedule shall start with the date of the Notice to Proceed and include submittals activities, the various construction activities, change order Work (when applicable), close-out, testing, demonstration of equipment operation when called for in the Specifications, and acceptance. The CPM schedule shall at a minimum correlate to the schedule of values line items and shall be cost loaded if requested by the Architect/Engineer or Principal Representative. The completion time shall be the time specified in the Agreement and all Project scheduling shall allocate float utilizing the full period available for construction as specified in the Agreement on State Form SC 6.13, without indication of early completion, unless such earlier completion is approved in writing by the Principal Representative and State Building Programs.

The time shown between the starting and completion dates of the various elements within the construction schedule shall represent one hundred per cent (100%) completion of each element.

All other elements of the CPM schedule shall be as required by the Specifications. In addition, the Contractor shall submit monthly updates or more frequently, if required by the Principal Representative, updates of the construction schedule. These updates shall reflect the Contractor's "Work in place" progress.

When requested by the Architect/Engineer, the Principal Representative or the State Buildings Program, the Contractor shall revise the construction schedule to reflect changes in the schedule of values.

When the testing of materials is required by the Specifications, the Contractor shall also prepare and submit to the Architect/Engineer and the Principal Representative a schedule for testing in accordance with Article 14, Samples and Testing.

ARTICLE 13. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. SUBMITTAL PROCESS

The Contractor shall check and field verify all dimensions. The Contractor shall check, approve and submit to the Architect/Engineer in accordance with the schedule described in Article 12, Requests for Information and Schedules, all Shop Drawings, Product Data and Samples required by the specifications or required by the Contractor for the Work of the various trades. All Drawings and Product Data shall contain identifying nomenclature and each submittal shall be accompanied by a letter of transmittal identifying in detail all enclosures. The number of copies of Shop Drawings and Product Data to be submitted shall be as specified in the Specifications and if no number is specified then three copies shall be submitted.

The Architect/Engineer shall review and comment on the Shop Drawings and Product Data within the time provided in the agreed upon schedule for conformance with information given and the design concept expressed in, or reasonably inferred from, the Contract Documents. The nature of all corrections to be made to the Shop Drawings and Product Data, if any, shall be clearly noted, and the submittals shall be returned to the Contractor for such corrections. If a change in the scope of the Work is intended by revisions requested to any Shop Drawings and Product Data, the Contractor shall be requested to prepare a change proposal in accordance with Article 35, Changes In The Work. On resubmitted Shop Drawings, Product Data or Samples, the Contractor shall direct specific attention in writing on the transmittal cover to revisions other than those corrections requested by the Architect/Engineer on any previously checked submittal. The Architect/Engineer shall promptly review and comment on, and return, the resubmitted items.

The Contractor shall thereafter furnish such other copies in the form approved by the Architect/Engineer as may be needed for the prosecution of the Work.

B. FABRICATION AND ORDERING

Fabrication shall be started by the Contractor only after receiving approved Shop Drawings from the Architect/Engineer. Materials shall be ordered in accordance with approved Product Data. Work which is improperly fabricated, whether through incorrect Shop Drawings, faulty workmanship or materials, will not be acceptable.

C. DEVIATIONS FROM DRAWINGS OR SPECIFICATIONS

The review and comments of the Architect/Engineer of Shop Drawings, Product Data or Samples shall not relieve the Contractor from responsibility for deviations from the Drawings or Specifications, unless he or she has in writing called the attention of the Architect/Engineer to such deviations at the time of submission, nor shall it relieve the Contractor from responsibility for errors of any sort in Shop Drawings or Product Data. Review and comments on Shop Drawings or Product Data containing identified deviations from the Contract Documents shall not be the basis for a Change Order or a claim based on a change in the scope of the Work unless Notice is given to the Architect/Engineer and Principal Representative of all additional costs, time and other impacts of the identified deviation by bring it to their attention in writing at the time the submittals are made, and any subsequent change in the Contract sum or the Contract time shall be limited to cost, time and impacts so identified.

D. CONTRACTOR REPRESENTATIONS

By preparing, approving, and/or submitting Shop Drawings, Product Data and Samples, the Contractor represents that the Contractor has determined and verified all materials, field measurements, and field construction criteria related thereto, and has checked and co-ordinated the information contained within each submittal with the requirements of the Work, the Project and the Contract Documents and prior reviews and approvals.

ARTICLE 14. SAMPLES AND TESTING

A. SAMPLES

The Contractor shall furnish for approval, with such promptness as to cause no delay in his or her Work or in that of any other Contractor, all Samples as directed by the Architect/Engineer. The Architect/Engineer shall check and approve such Samples, with reasonable promptness, but only for conformance with the design intent of the Contract Documents and the Project, and for compliance with any submission requirements given in the Contract Documents.

B. TESTING - GENERAL

The Contractor shall provide such equipment and facilities as the Architect/Engineer may require for conducting field tests and for collecting and forwarding samples to be tested. Samples themselves shall not be incorporated into the Work after approval without the permission of the Architect/Engineer.

All materials or equipment proposed to be used may be tested at any time during their preparation or use. The Contractor shall furnish the required samples without charge and shall give sufficient Notice of the placing of orders to permit the testing thereof. Products may be sampled either prior to shipment or after being received at the site of the Work.

Tests shall be made by an accredited testing laboratory. Except as otherwise provided in the Specifications, sampling and testing of all materials, and the laboratory methods and testing equipment, shall be in accordance with the latest standards and tentative methods of the American Society of Testing Materials (ASTM). The cost of testing which is in addition to the requirements of the Specifications shall be paid by the Contractor if so directed by the Architect/Engineer, and the Contract sum shall be adjusted accordingly by Change Order ; provided however, that whenever testing shows portions of the Work to be deficient, all costs of testing including that required to verify the adequacy of repair or replacement Work shall be the responsibility of the Contractor.

C. TESTING - CONCRETE AND SOILS

Unless otherwise specified or provided elsewhere in the Contract Documents, the Principal Representative will contract for and pay for the testing of concrete and for soils compaction testing through an independent laboratory or laboratories selected and approved by the Principal Representative. The Contractor shall assume the responsibility of arranging, scheduling and coordinating the concrete sample collection efforts and soils compaction efforts in an efficient and cost effective manner. Testing shall be performed in accordance with the requirements of the Specifications, and if no requirements are specified, the Contractor shall request instructions and testing shall be as directed by the Architect/Engineer or the soils engineer, as applicable, and in accordance with standard industry practices.

The Principal Representative and the Architect/Engineer shall be given reasonable advance notice of each concrete pour and reserve the right to either increase or decrease the number of cylinders or the frequency of tests.

Soil compaction testing shall be at random locations selected by the soils engineer. In general, soils compaction testing shall be as directed by the soils engineer and shall include all substrate prior to backfill or construction.

D. TESTING - OTHER

Additional testing required by the Specifications will be accomplished and paid for by the Principal Representative in a manner similar to that for concrete and soils unless noted otherwise in the Specifications. In any case, the Contractor will be responsible for arranging, scheduling and coordinating additional tests. Where the additional testing will be contracted and paid for by the Principal Representative the Contractor shall give the Principal Representative not less than one month advance written Notice of the date the first such test will be required.

ARTICLE 15. SUBCONTRACTS

A. CONTRACT PERFORMANCE OUTSIDE OF THE UNITED STATES OR COLORADO

After the contract is awarded, Contractor is required to provide written notice to the Principal Representative no later than twenty (20) days after deciding to perform services under this contract outside the United States or Colorado or to subcontract services under this contract to a subcontractor that will perform such services outside the United States or Colorado. The written notification must include, but need not be limited to, a statement of the type of services that will be performed at a location outside the United States or Colorado and the reason why it is necessary or advantageous to go outside the United States or Colorado to perform the services. All notices received by the State pursuant to outsourced services shall be posted on the Colorado Department of Personnel & Administration's website. If Contractor knowingly fails to notify the Principal Representative of any outsourced services as specified herein, the Principal Representative, at its discretion, may terminate this contract as provided in C.R.S. § 24-102-206 (4). (Does not apply to any project that receives federal moneys)

B. SUBCONTRACTOR LIST

Prior to the Notice to Proceed to commence construction, the Contractor shall submit to the Architect/Engineer, the Principal Representative and State Buildings Program a preliminary list of Subcontractors. It shall be as complete as possible at the time, showing all known Subcontractors planned for the Work. The list shall be supplemented as other Subcontractors are determined by the Contractor and any such supplemental list shall be submitted to the Architect/Engineer, the Principal Representative and State Buildings Program not less than ten (10) days before the Subcontractor commences Work.

C. SUBCONTRACTOR SUBSTITUTIONS

The Contractor's list shall include those Subcontractors, if any, which the Contractor indicated in its bid, would be employed for specific portions of the Work if such indication was requested in the bid documents issued by the State. The substitution of any Subcontractor listed in the Contractor's bid shall be justified in writing not less than ten (10) days after the date of the Notice to Proceed to commence construction, and shall be subject to the approval of the Principal Representative. For reasons such as the Subcontractor's refusal to perform as agreed, subsequent unavailability or later discovered bid errors, or other similar reasons, but not including the availability of a lower Subcontract price, such substitution may be approved. The Contractor shall bear any additional cost incurred by such substitutions.

D. CONTRACTOR RESPONSIBLE FOR SUBCONTRACTORS

The Contractor shall not employ any Subcontractor that the Architect/Engineer, within ten (10) days after the date of receipt of the Contractor's list of Subcontractors or any supplemental list, objects to in writing as being unacceptable to either the Architect/Engineer, the Principal Representative or State Buildings Program. If a Subcontractor is deemed unacceptable, the Contractor shall propose a substitute Subcontractor and the Contract sum shall be adjusted by any demonstrated difference between the Subcontractor's bids, except where the Subcontractor has been debarred by the State or fails to meet qualifications of the Contract Documents to perform the Work proposed.

The Contractor shall be fully responsible to the Principal Representative for the acts and omissions of Subcontractors and of persons either directly or indirectly employed by them. All instructions or orders in respect to Work to be done by Subcontractors shall be given to the Contractor.

ARTICLE 16. RELATIONS OF CONTRACTOR AND SUBCONTRACTOR

The Contractor agrees to bind each Subcontractor to the terms of these General Conditions and to the requirements of the Drawings and Specifications, and any Addenda thereto, and also all the other Contract Documents, so far as applicable to the Work of such Subcontractor. The Contractor further agrees to bind each Subcontractor to those terms of the General Conditions which expressly require that Subcontractors also be bound, including without limitation, requirements that Subcontractors waive all rights of subrogation, provide adequate general commercial liability and property insurance, automobile insurance and workers' compensation insurance as provided in Article 25, Insurance.

Nothing contained in the Contract Documents shall be deemed to create any contractual relationship whatsoever between any Subcontractor and the State of Colorado acting by and through its Principal Representative.

ARTICLE 17. MUTUAL RESPONSIBILITY OF CONTRACTORS

Should the Contractor cause damage to any separate contractor on the Work, the Contractor agrees, upon due Notice, to settle with such contractor by agreement, if he or she will so settle. If such separate contractor sues the Principal Representative on account of any damage alleged to have been so sustained, the Principal Representative shall notify the Contractor, who shall defend such proceedings if requested to do so by Principal Representative. If any judgment against the Principal Representative arises there from, the Contractor shall pay or satisfy it and pay all costs and reasonable attorney fees incurred by the Principal Representative, in accordance with Article 52C, Indemnification, provided the Contractor was given due Notice of an opportunity to settle.

ARTICLE 18. SEPARATE CONTRACTS

The Principal Representative reserves the right to enter into other contracts in connection with the Project or the Contract. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate his or her Work with theirs. If any part of the Contractor's Work depends, for proper execution or results, upon the Work of any other contractor, the Contractor shall inspect and promptly report to the Architect/Engineer any defects in such Work that render it unsuitable for such proper execution and results. Failure of the Contractor to so inspect and report shall constitute an acceptance of the other contractor's Work as fit and proper for the reception of Work, except as to defects which may develop in the other Contractor's Work after the execution of the Contractor's Work.

To insure the proper execution of subsequent Work, the Contractor shall measure Work already in place and shall at once report to the Architect/Engineer any discrepancy between the executed Work and the Drawings.

ARTICLE 19. USE OF PREMISES

The Contractor shall confine apparatus, the storage of materials and the operations of workmen to limits indicated by law, ordinances, permits and any limits lines shown on the Drawings. The Contractor shall not unreasonably encumber the premises with materials.

The Contractor shall enforce all of the Architect/Engineer's instructions and prohibitions regarding, without limitation, such matters as signs, advertisements, fires and smoking.

ARTICLE 20. CUTTING, FITTING OR PATCHING

The Contractor shall do all cutting, fitting or patching of Work that may be required to make its several parts come together properly and fit it to receive or be received by Work of other Contractors shown upon, or reasonably inferred from, the Drawings and Specifications for the complete structure, and shall provide for such finishes to patched or fitted Work as the Architect/Engineer may direct. The Contractor shall not endanger any Work by cutting, excavating or otherwise altering the Work and shall not cut or alter the Work of any other Contractor save with the consent of the Architect/Engineer.

ARTICLE 21. UTILITIES

A. TEMPORARY UTILITIES

Unless otherwise specifically stated in the Specifications or on the Drawings, the Principal Representative shall be responsible for the locations of all utilities as shown on the Drawings or indicated elsewhere in the Specifications, subject to the Contractor's compliance with all statutory or regulatory requirements to call for utility locates. When actual conditions deviate from those shown the Contractor shall comply with the requirements of Article 37, Differing Site Conditions. The Contractor shall provide and pay for the installation of all temporary utilities required to supply all the power, light and water needed by him and other Contractors for their Work and shall install and maintain all such utilities in such manner as to protect the public and Workmen and conform with any applicable laws and regulations. Upon completion of the Work, he or she shall remove all such temporary utilities from the site. The Contractor shall pay for all consumption of power, light and water used by him or her and the

other Contractors, without regard to whether such items are metered by temporary or permanent meters. The Superintendent shall have full authority over all trades and Subcontractors at any tier to prevent waste. The cut-off date on permanent meters shall be either the agreed date of the date of the Notice of Substantial Completion or the Notice of Approval of Occupancy/Use of the Project.

B. PROTECTION OF EXISTING UTILITIES

Where existing utilities, such as water mains, sanitary sewers, storm sewers and electrical conduits, are shown on the Drawings, the Contractor shall be responsible for the protection thereof, without regard to whether any such utilities are to be relocated or removed as a part of the Work. If any utilities are to be moved, the moving must be conducted in such manner as not to cause undue interruption or delay in the operation of the same.

C. CROSSING OF UTILITIES

When new construction crosses highways, railroads, streets, or utilities under the jurisdiction of State, city or other public agency, public utility or private entity, the Contractor shall secure proper written permission before executing such new construction. The Contractor will be required to furnish a proper release before final acceptance of the Work.

ARTICLE 22. UNSUITABLE CONDITIONS

The Contractor shall not Work at any time, or permit any Work to be done, under any conditions contrary to those recommended by manufacturers or industry standards which are otherwise proper, unsuited for proper execution, safety and performance. Any cost caused by ill-timed Work shall be borne by the Contractor unless the timing of such Work shall have been directed by the Architect/Engineer or the Principal Representative, after the award of the Contract, and the Contractor provided Notice of any additional cost.

ARTICLE 23. TEMPORARY FACILITIES

A. OFFICE FACILITIES

The Contractor shall provide and maintain without additional expense for the duration of the Project temporary office facilities, as required and as specified, for its own use and the use of the Architect/Engineer, representatives of the Principal Representative and State Buildings Program.

B. TEMPORARY HEAT

The Contractor shall furnish and pay for all the labor, facilities, equipment, fuel and power necessary to supply temporary heating, ventilating and air conditioning, except to the extent otherwise specified, and shall be responsible for the installation, operation, maintenance and removal of such facilities and equipment. Unless otherwise specified, the permanent HVAC system shall not be used for temporary heat in whole or in part. If the Contractor desires to put the permanent system into use, in whole or in part, the Contractor shall set it into operation and furnish the necessary fuel and manpower to safely operate, protect and maintain that HVAC system. Any operation of all or any part of the permanent HVAC system including operation for testing purposes shall not constitute acceptance of the system, nor shall it relieve the Contractor of his or her one-year guarantee of the system from the date of the Notice of Substantial Completion of the entire Project, and if necessary due to prior operation, the Contractor shall provide manufacturers' extended warranties from the date of the Contractor's use prior to the date of the Notice of Substantial Completion.

C. WEATHER PROTECTION

The Contractor shall, at all times, provide protection against weather, so as to maintain all Work, materials, apparatus and fixtures free from injury or damages.

D. DUST PARTITIONS

If the Work involves Work in an occupied existing building, the Contractor shall erect and maintain during the progress of the Work, suitable dust-proof temporary partitions, or more permanent partitions as specified, to protect such building and the occupants thereof.

E. BENCH MARKS

The Contractor shall maintain any site bench marks provided by the Principal Representative and shall establish any additional benchmarks specified by the Architect/Engineer as necessary for the Contractor to layout the Work and ascertain all grades and levels as needed.

F. SIGN

The Contractor shall erect and permit one 4' x 8' sign only at the site to identify the Project as specified or directed by the Architect/Engineer which shall be maintained in good condition during the life of the Project.

G. SANITARY PROVISION

The Contractor shall provide and maintain suitable, clean, temporary sanitary toilet facilities for any and all workmen engaged on the Work, for the entire construction period, in strict compliance with the requirement of all applicable codes, regulations, laws and ordinances, and no other facilities, new or existing, may be used by any person on the Project. When the Project is complete the Contractor shall promptly remove them from the site, disinfect, and clean or treat the areas as required. If any new construction surfaces in the Project other than the toilet facilities provided for herein are soiled at any time, the entire areas so soiled shall be completely removed from the Project and rebuilt. In no event may present toilet facilities of any existing building at the site of the Work be used by employees of any contractor.

ARTICLE 24. CLEANING UP

The Contractor shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by employees or Work, and at the completion of the Work shall remove all such surplus material, waste material, dirt, and rubbish, as well as all tools, equipment and scaffolding, and shall wash and clean all window glass and plumbing fixtures, perform cleanup and cleaning required by the Specifications and leave all of the Work clean unless more exact requirements are specified.

ARTICLE 25. INSURANCE

A. GENERAL

The Contractor shall procure and maintain all insurance requirements and limits as set forth below, at his or her own expense, for the length of time set forth in Contract requirements. The Contractor shall continue to provide evidence of such coverage to State of Colorado on an annual basis during the aforementioned period including all of the terms of the insurance and indemnification requirements of this agreement. All below insurance policies shall include a provision preventing cancellation without thirty (30) days' prior notice by certified mail. A completed Certificate of Insurance shall be filed with the Principal Representative and State Buildings Program within ten (10) days after the date of the Notice of Award, said Certificate to specifically state the inclusion of the coverages and provisions set forth herein and shall state whether the coverage is "claims made" or "per occurrence".

B. COMMERCIAL GENERAL LIABILITY INSURANCE (CGL)

This insurance must protect the Contractor from all claims for bodily injury, including death and all claims for destruction of or damage to property (other than the Work itself), arising out of or in connection with any operations under this Contract, whether such operations be by the Contractor or by any Subcontractor under him or anyone directly or indirectly employed by the Contractor or by a Subcontractor. All such insurance shall be written with limits and coverages as specified below and shall be written on an occurrence form.

General Aggregate	$2,000,000
Products – Completed Operations Aggregate	$2,000,000
Each Occurrence	$1,000,000
Personal Injury	$1,000,000

The following coverages shall be included in the CGL:

1. Per project general aggregate (CG 25 03 or similar)
2. Additional Insured status in favor of the State of Colorado and any other parties as outlined in The Contract and must include both ONGOING Operations AND COMPLETED Operations per CG2010 10/01 and CG 2037 10/01 or equivalent as permitted by law.
3. The policy shall be endorsed to be **primary and non-contributory** with any insurance maintained by Additional Insureds.
4. A waiver of Subrogation in favor of all Additional Insured parties.
5. Personal Injury Liability
6. Contractual Liability coverage to support indemnification obligation per Article 53.I
7. Explosion, collapse and underground (xcu)

The following exclusionary endorsements are prohibited in the CGL policy:

1. Damage to Work performed by Subcontract/Vendor (CG 22-94 or similar)
2. Contractual Liability Coverage Exclusion modifying or deleting the definition of an "insured contract" from the unaltered SO CG 0001 1001 policy from (CG 24 26 or similar)
3. If applicable to the Work to be performed: Residential or multi-family
4. If applicable to the Work to be performed :Exterior insulation finish systems
5. If applicable to the Work to be performed: Subsidence or Earth Movement

The Contractor shall maintain general liability coverage including Products and Completed Operations insurance, and the Additional Insured with primary and non-contributory coverage as specified in this Contract for three (3) years after completion of the project.

C. AUTOMOBILE LIABILITY INSURANCE and business auto liability covering liability arising out of any auto (including owned, hired and non-owned autos).

Combined Bodily Injury and Property Damage Liability
(Combined Single Limit): $1,000,000 each accident

Coverages:
Specific waiver of subrogation

D. WORKERS' COMPENSATION INSURANCE
The Contractor shall procure and maintain Workers' Compensation Insurance at his or her own expense during the life of this Contract, including occupational disease provisions for all employees per statutory requirements. Policy shall contain a waiver of subrogation in favor of the State of Colorado.

The Contractor shall also require each Subcontractor to furnish Workers' Compensation Insurance, including occupational disease provisions for all of the latter's employees, and to the extent not furnished, the Contractor accepts full liability and responsibility for Subcontractor's employees.

In cases where any class of employees engaged in hazardous Work under this Contract at the site of the Project is not protected under the Workers' Compensation statute, the Contractor shall provide, and shall cause each Subcontractor to provide, adequate and suitable insurance for the protection of employees not otherwise protected.

E. UMBRELLA LIABILITY INSURANCE (for construction projects exceeding $10,000,000, provide the following coverage):
The Contractor shall maintain umbrella/excess liability insurance on an occurrence basis in excess of the underlying insurance described in Section B-D above. Coverage shall follow the terms of the underlying insurance, included the additional insured and waiver of subrogation provisions. The amounts of insurance required in Sections above may be satisfied by the Contractor purchasing coverage for the limits specified or by any combination of underlying and umbrella limits, so long as the total amount of insurance is not less than the limits specified in each section previously mentioned.

Each occurrence	$5,000,000
Aggregate	$5,000,000

F. BUILDER'S RISK INSURANCE

Unless otherwise expressly stated in the Supplementary General Conditions (e.g. where the State elects to provide for projects with a completed value of less than $1,000,000), the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Owner has an insurable interest in the property, or the Date of Notice specified on the Notice of Acceptance, State Form SBP-6.27 or whichever is later.

This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project as named insureds.

All associated deductibles shall be the responsibility of the Contractor. Such policy may have a deductible clause but not to exceed ten thousand dollars ($10,000.00).

Property insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, false Work, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

Contractor shall maintain Builders Risk coverage including partial use by Owner.
The Contractor shall waive all rights of subrogation as regards the State of Colorado and the Principal Representative, its officials, its officers, its agents and its employees, all while acting within the scope and course of their employment For damages caused by fire or thoer causes of loss to the extent covered by property insurance obtained pursuant to this Section or other property insurance applicable to the Work. The Contractor shall require all Subcontractors at any tier to similarly waive all such rights of subrogation and shall expressly include such a waiver in all subcontracts.

Upon request, the amount of such insurance shall be increased to include the cost of any additional Work to be done on the Project, or materials or equipment to be incorporated in the Project, under other independent contracts let or to be let. In such event, the Contractor shall be reimbursed for this cost as his or her share of the insurance in the same ratio as the ratio of the insurance represented by such independent contracts let or to be let to the total insurance carried.

The Principal Representative, with approval of the State Controller, shall have the power to adjust and settle any loss. Unless it is agreed otherwise, all monies received shall be applied first on rebuilding or repairing the destroyed or injured Work.

G. POLLUTION LIABILITY INSURANCE

If Contractor is providing directly or indirectly Work with pollution/environmental hazards, the Contractor must provide or cause those conducting the Work to provide Pollution Liability Insurance coverage. Pollution Liability policy must include contractual liability coverage. State of Colorado must be included as additional insureds on the policy. The policy limits shall be in the amount of $1,000,000 with maximum deductible of $25,000 to be paid by the Subcontractor/Vendor.

H. ADDITIONAL MISCELLANEOUS INSURANCE PROVISIONS

Certificates of Insurance and/or insurance policies required under this Contract shall be subject to the following stipulations and additional requirements:

1. Any and all deductibles or self-insured retentions contained in any Insurance policy shall be assumed by and at the sole risk of the Contractor;
2. If any of the said policies shall fail at any time to meet the requirements of the Contract Documents as to form or substance, or if a company issuing any such policy shall be or at any time cease to be approved by the Division of Insurance of the State of Colorado, or be or cease to be in compliance with any stricter requirements of the Contract Documents, the Contractor shall promptly obtain a new policy, submit the same to the Principal Representative and State Building Programs for approval if requested, and submit a Certificate of Insurance as hereinbefore provided. Upon failure of the Contractor to furnish, deliver and maintain such insurance as provided herein, this Contract, in the sole discretion of the State of Colorado, may be immediately declared suspended, discontinued, or terminated. Failure of the Contractor in obtaining and/or maintaining any required insurance shall not relieve the Contractor from any liability under the Contract, nor shall the insurance requirements be construed to conflict with the obligations of the Contractor concerning indemnification;
3. All requisite insurance shall be obtained from financially responsible insurance companies, authorized to do business in the State of Colorado and acceptable to the Principal Representative;
4. Receipt, review or acceptance by the Principal Representative of any insurance policies or certificates of insurance required by this Contract shall not be construed as a waiver or relieve the Contractor from its obligation to meet the insurance requirements contained in these General Conditions.

ARTICLE 26. CONTRACTOR'S PERFORMANCE AND PAYMENT BONDS

The Contractor shall furnish a Performance Bond and a Labor and Material Payment Bond on State Forms SC-6.22, Performance Bond, and SC-6.221, Labor and Material Payment Bond, or such other forms as State Buildings Program may approve for the Project, executed by a corporate Surety authorized to do business in the State of Colorado and in the full amount of the Contract sum. The expense of these bonds shall be borne by the Contractor and the bonds shall be filed with State Buildings Program.

If, at any time, a Surety on such a bond is found to be, or ceases to be in strict compliance with any qualification requirements of the Contract Documents or the bid documents, or loses its right to do business in the State of Colorado, another Surety will be required, which the Contractor shall furnish to State Buildings Program within ten (10) days after receipt of Notice from the State or after the Contractor otherwise becomes aware of such conditions.

ARTICLE 27. LABOR AND WAGES

In accordance with laws of Colorado, C.R.S. § 8-17-101(1), as amended, Colorado labor shall be employed to perform at least eighty percent of the Work. If the Federal Davis-Bacon Act shall be applicable to the Project, as indicated in Article 6B (Design/Bid/Build Agreement SC-6.21), Modification of Article 27, the minimum wage rates to be paid on the Project will be specified in the Contract Documents.

ARTICLE 28. ROYALTIES AND PATENTS

The Contractor shall be responsible for assuring that all rights to use of products and systems have been properly arranged and shall take such action as may be necessary to avoid delay, at no additional charge to the Principal Representative, where such right is challenged during the course of the Work. The Contractor shall pay all royalties and license fees required to be paid and shall defend all suits or claims for infringement of any patent rights and shall save the State of Colorado harmless from loss on account thereof, in accordance with Article 52C, Indemnification; provided, however, the Contractor shall not be responsible for such loss or defense for any copyright violations contained in the Contract Documents prepared by the Architect/Engineer or the Principal Representative of which the Contractor is unaware, or for any patent violations based on

specified processes that the Contractor is unaware are patented or that the Contractor should not have had reason to believe were patented.

ARTICLE 29. ASSIGNMENT

Except as otherwise provided hereafter the Contractor shall not assign the whole or any part of this Contract without the written consent of the Principal Representative. This provision shall not be construed to prohibit assignments of the right to payment to the extent permitted by C.R.S. § 4-9-406, et. seq., as amended, provided that written Notice of assignment adequate to identify the rights assigned is received by the Principal Representative and the controller for the agency, department, or institution executing this Contract (as distinguished from the State Controller). Such assignment of the right to payment shall not be deemed valid until receipt by the Principal Representative and such controller and the Contractor assumes the risk that such written Notice of assignment is received by the Principal Representative and the controller for the agency, department, or institution involved. In case the Contractor assigns all or part of any moneys due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to all claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract, whether said service or materials were supplied prior to or after the assignment. Nothing in this Article shall be deemed a waiver of any other defenses available to the State against the Contractor or the assignee.

ARTICLE 30. CORRECTION OF WORK BEFORE ACCEPTANCE

The Contractor shall promptly remove from the premises all Work or materials condemned or declared irreparably defective as failing to conform to the Contract Documents on receipt of written Notice from the Architect/Engineer or the Principal Representative, whether incorporated in the Work or not. If such materials shall have been incorporated in the Work, or if any unsatisfactory Work is discovered, the Contractor shall promptly replace and re-execute his or her Work in accordance with the requirements of the Contract Documents without expense to the Principal Representative, and shall also bear the expense of making good all Work of other contractors destroyed or damaged by the removal or replacement of such defective material or Work.

Should any defective Work or material be discovered during the process of construction, or should reasonable doubt arise as to whether certain material or Work is in accordance with the Contract Documents, the value of such defective or questionable material or Work shall not be included in any application for payment, or if previously included, shall be deducted by the Architect/Engineer from the next application submitted by the Contractor.

If the Contractor does not perform repair, correction and replacement of defective Work, in lieu of proceeding by issuance of a Notice of intent to remove condemned Work as outlined above, the Principal Representative may, not less than seven (7) days after giving the original written Notice of the need to repair, correct, or replace defective Work, deduct all costs and expenses of replacement or correction as instructed by the Architect/Engineer from the Contractor's next application for payment in addition to the value of the defective Work or material. The Principal Representative may also make an equitable deduction from the Contract sum by unilateral Change Order, in accordance with Article 33, Payments Withheld and Article 35, Changes In The Work.

If the Contractor does not remove such condemned or irreparably defective Work or material within a reasonable time, the Principal Representative may, after giving a second seven (7) day advance Notice to the Contractor and the Surety, remove them and may store the material at the Contractor's expense. The Principal Representative may accomplish the removal and replacement with its own forces or with another Contractor. If the Contractor does not pay the expense of such removal and pay all storage charges within ten (10) days thereafter, the Principal Representative may, upon ten (10) days' written Notice, sell such material at auction or at private sale and account for the net proceeds thereof, after deducting all costs and expenses which should have been borne by the Contractor. If the Contractor shall commence and diligently pursue such removal and replacement before the expiration of the seven day period, or if the Contractor shall show good cause in conjunction with submittal of a revised CPM schedule showing when the Work will be performed and

why such removal of condemned Work should be scheduled for a later date, the Principal Representative shall not proceed to remove or replace the condemned Work.

If the Contractor disagrees with the Notice to remove Work or materials condemned or declared irreparably defective, the Contractor may request facilitated negotiation of the issue and the Principal Representative's right to proceed with removal and to deduct costs and expenses of repair shall be suspended and tolled until such time as the parties meet and negotiate the issue

During construction, whenever the Architect/Engineer has advised the Contractor in writing, in the Specifications, by reference to Article 6, Architect/Engineer Decisions And Judgments, of these General Conditions or elsewhere in the Contract Documents of a need to observe materials in place prior to their being permanently covered up, it shall be the Contractor's responsibility to notify the Architect/Engineer at least forty-eight (48) hours in advance of such covering operation. If the Contractor fails to provide such notification, Contractor shall, at his or her expense, uncover such portions of the Work as required by the Architect/Engineer for observation, and reinstall such covering after observation. When a covering operation is continued from day to day, notification of the commencement of a single continuing covering operation shall suffice for the activity specified so long as it proceeds regularly and without interruption from day to day, in which event the Contractor shall coordinate with the Architect/Engineer regarding the continuing covering operation.

ARTICLE 31. APPLICATIONS FOR PAYMENTS

A. CONTRACTOR'S SUBMITTALS

On or before the first day of each month and no more than five days prior thereto, the Contractor may submit applications for payment for the Work performed during such month covering the portion of the Work completed as of the date indicated, and payments on account of this Contract shall be due per § 24-30-202(24) (correct notice of amount due), within forty-five (45) days of receipt by the Principal Representative of application for payments that have been certified by the Architect/Engineer. The Contractor shall submit the application for payment to the Architect/Engineer on State forms SBP-7.2, Certificate for Contractor's Payment, or such other format as the State Buildings Program shall approve, in an itemized format in accordance with the schedule of values or a cost loaded CPM schedule when required, supported to the extent reasonably required by the Architect/Engineer or the Principal Representative by receipts or other vouchers, showing payments for materials and labor, prior payments and payments to be made to Subcontractors and such other evidence of the Contractor's right to payments as the Architect/Engineer or Principal Representative may direct.

If payments are made on account of materials not incorporated in the Work but delivered and suitably stored at the site, or at some other location agreed upon in writing, such payments shall be conditioned upon submission by the Contractor of bills of sale or such other procedure as will establish the Principal Representative's title to such material or otherwise adequately protect the Principal Representative's interests, and shall provide proof of insurance whenever requested by the Principal Representative or the Architect/Engineer, and shall be subject to the right to inspect the materials at the request of either the Architect/Engineer or the Principal Representative.

All applications for payment, except the final application, and the payments there under, shall be subject to correction in the next application rendered following the discovery of any error.

B. ARCHITECT/ENGINEER CERTIFICATION

In accordance with the Architect/Engineer's agreement with the Principal Representative, the Architect/Engineer after appropriate observation of the progress of the Work shall certify to the Principal Representative the amount that the Contractor is entitled to, and forward the application to the Principal Representative. If the Architect/Engineer certifies an amount different from the amount requested or otherwise alters the Contractor's application for payment, a copy shall be forwarded to the Contractor.

If the Architect/Engineer is unable to certify all or portions of the amount requested due to the absence or lack of required supporting evidence, the Architect/Engineer shall advise the Contractor of the deficiency. If the deficiency is not corrected at the end of ten (10) days, the Architect/Engineer may

either certify the remaining amounts properly supported to which the Contractor is entitled, or return the application for payment to the Contractor for revision with a written explanation as to why it could not be certified.

C. RETAINAGE WITHHELD

Unless otherwise provided in the Supplementary General Conditions, an amount equivalent to five percent (5%) of the amount shown to be due the Contractor on each application for payment shall be withheld until the Work required by the Contract has been performed. The withheld percentage of the contract price of any such Work, improvement, or construction shall be administered according to § 24-91-103, C.R.S., as amended, and § 38-26-107, C.R.S., as amended, and Article 31D, shall be retained until the Work or discrete portions of the Work, have been completed satisfactorily, finally or partially accepted, and advertised for final settlement as further provided in Article 41.

D. RELEASE OF RETAINAGE

The Contractor may, for satisfactory and substantial reasons shown to the Principal Representative's satisfaction, make a written request to the Principal Representative and the Architect/Engineer for release of part or all of the withheld percentage applicable to the Work of a Subcontractor which has completed the subcontracted Work in a manner finally acceptable to the Architect/Engineer, the Contractor, and the Principal Representative. Any such request shall be supported by a written approval from the Surety furnishing the Contractor's bonds and any surety that has provided a bond for the Subcontractor. The release of any such withheld percentage shall be further supported by such other evidence as the Architect/Engineer or the Principal Representative may require, including but not limited to, evidence of prior payments made to the Subcontractor, copies of the Subcontractor's contract with the Contractor, any applicable warranties, as-built information, maintenance manuals and other customary close-out documentation. Neither the Principal Representative nor the Architect Engineer shall be obligated to review such documentation nor shall they be deemed to assume any obligations to third parties by any review undertaken.

The Contractor's obligation under these General Conditions to guarantee Work for one year from the date of the Notice of Substantial Completion or the date of any Notice of Partial Substantial Completion of the applicable portion or phase of the Project, shall be unaffected by such partial release; unless a Notice of Partial Substantial Completion is issued for the Work subject to the release of retainage.

Any rights of the Principal Representative which might be terminated by or from the date of any final acceptance of the Work, whether at common law or by the terms of this Contract, shall not be affected by such partial release of retainage prior to any final acceptance of the entire Project.

The Contractor remains fully responsible for the Subcontractor's Work and assumes any risk that might arise by virtue of the partial release to the Subcontractor of the withheld percentage, including the risk that the Subcontractor may not have fully paid for all materials, labor and equipment furnished to the Project.

If the Principal Representative considers the Contractor's request for such release satisfactory and supported by substantial reasons, the Architect/Engineer shall make a "final inspection" of the applicable portion of the Project to determine whether the Subcontractor 's Work has been completed in accordance with the Contract Documents. A final punch list shall be made for the Subcontractor's Work and the procedures of Article 41, Completion, Final Inspection, Acceptance and Settlement, shall be followed for that portion of the Work, except that advertisement of the intent to make final payment to the Subcontractor shall be required only if the Principal Representative has reason to believe that a supplier or Subcontractor to the Subcontractor for which the request is made, may not have been fully paid for all labor and materials furnished to the Project.

ARTICLE 32. CERTIFICATES FOR PAYMENTS

State Form SBP-7.2, Certificate For Contractor's Payment, and its continuation detail sheets, when submitted, shall constitute the Certificate of Contractor 's Application for Payment, and shall be a representation by the Contractor to the Principal Representative that the Work has progressed to the point indicated, the quality of

the Work is in accordance with the Contract Documents, and materials for which payment is requested have been incorporated into the Project except as noted in the application. If requested by the Principal Representative the Certificate of Contractor's Application for Payment shall be sworn under oath and notarized.

ARTICLE 33. PAYMENTS WITHHELD

The Architect/Engineer, the Principal Representative or State Buildings Program may withhold, or on account of subsequently discovered evidence nullify, the whole or any part of any application on account of, but not limited to any of the following:

1. Defective Work not remedied;
2. Claims filed or reasonable evidence indicating probable filing of claims;
3. Failure of the Contractor to make payments to Subcontractors for material or labor;
4. A reasonable doubt that the Contract can be completed for the balance of the contract price then unpaid;
5. Damage or injury to another contractor or any other person, persons or property except to the extent of coverage by a policy of insurance;
6. Failure to obtain necessary permits or licenses or to comply with applicable laws, ordinances, codes, rules or regulations or the directions of the Architect/Engineer;
7. Failure to submit a monthly construction schedule;
8. Failure of the Contractor to keep Work progressing in accordance with the time schedule;
9. Failure to keep a superintendent on the Work;
10. Failure to maintain as built drawings of the Work in progress;
11. Unauthorized deviations by the Contractor from the Contract Documents; or
12. On account of liquidated damages.

In addition, the Architect Engineer, Principal Representative or State Buildings Program may withhold or nullify the whole or any part of any application for any reason noted elsewhere in these General Conditions of the Contractor's Design/Bid/Build Agreement. Nullification shall mean reduction of amounts shown as previously paid on the application. The amount withheld or nullified may be in such amount as the Architect/Engineer or the Principal Representative estimates to be required to allow the State to accomplish the Work, cure the failure and cover any damages or injuries, including an allowance for attorneys fees and costs where appropriate. When the grounds for such withholding or nullifying are removed, payment shall be made for the amounts thus withheld or nullified on such grounds.

ARTICLE 34. DEDUCTIONS FOR UNCORRECTED WORK

If the Architect/Engineer and the Principal Representative deem it inexpedient to correct Work damaged or not performed in accordance with the Contract Documents, the Principal Representative may, after consultation with the Architect/Engineer and ten (10) days' Notice to the Contractor of intent to do so, make reasonable reductions from the amounts otherwise due the Contractor on the next application for payment. Notice shall specify the amount or terms of any contemplated reduction. The Contractor may during this period correct or perform the Work. If the Contractor does not correct or perform the Work, an equitable deduction from the Contract sum shall be made by Change Order, in accordance with Article 35, Changes In The Work, unilaterally if necessary. If either party elects facilitation of this issue after Notice is given, the ten-day (10) notice period shall be extended and tolled until facilitation has occurred.

ARTICLE 35. CHANGES IN THE WORK

The Principal Representative may designate, without invalidating the Agreement, and with the approval of State Buildings Program and the State Controller, may order extra Work or make changes with or without the consent of the Contractor as hereafter provided, by altering, adding to or deducting from the Work, the Contract sum being adjusted accordingly. All such changes in the Work shall be within the general scope of and be executed under the conditions of the Contract, except that any claim for extension of time made necessary due to the change or any claim of other delay or other impacts caused by or resulting from the change in the Work shall be presented by the Contractor and adjusted by Change Order to the extent known at the time such change is ordered and before proceeding with the extra or changed Work. Any claims for extension of time or of delay or other impacts, and any costs associated with extension of time, delay or other impacts,

which are not presented before proceeding with the change in the Work, and which are not adjusted by Change Order to the extent known, shall be waived.

The Architect/Engineer shall have authority to make minor changes in the Work, not involving extra cost, and not inconsistent with the intent of the Contract Documents, but otherwise, except in an emergency endangering life or property, no extra Work or change in the Contract Documents shall be made unless by 1) a written Change Order, approved by the Principal Representative, State Buildings Program, and the State Controller prior to proceeding with the changed Work; or 2) by an Emergency Field Change Order approved by the Principal Representative and State Buildings Program as hereafter provided in Article 35C, Emergency Field Ordered Changed Work; or 3) by an allocation in writing of any allowance already provided in the encumbered contract amount, the Contract sum being later adjusted to decrease the Contract sum by any unallocated or unexpended amounts remaining in such allowance. No change to the Contract sum shall be valid unless so ordered.

A. THE VALUE OF CHANGED WORK

1. The value of any extra Work or changes in the Work shall be determined by agreement in one or more of the following ways:
   a. By estimate and acceptance of a lump-sum amount;
   b. By unit prices specified in the Agreement, or subsequently agreed upon, that are extended by specific quantities;
   c. By actual cost plus a fixed fee in a lump sum amount for profit, overhead and all indirect and off-site home office costs, the latter amount agreed upon in writing prior to starting the extra or changed Work.
2. Where the Contractor and the Principal Representative cannot agree on the value of extra Work, the Principal Representative may order the Contractor to perform the changes in the Work and a Change Order may be unilaterally issued based on an estimate of the change in the Work prepared by the Architect/Engineer. The value of the change in the Work shall be the Principal Representative's determination of the amount of equitable adjustment attributable to the extra Work or change. The Principal Representative's determination shall be subject to appeal by the Contractor pursuant to the claims process in Article 36, Claims.
3. Except as otherwise provided in Article 35B, Detailed Breakdown, below, the Cost Principles of the Colorado Procurement Rules in effect on the date of this Contract, pursuant to § 24-107-101, C.R.S., as amended, shall govern all Contract changes.

B. DETAILED BREAKDOWN

In all cases where the value of the extra or changed Work is not known based on unit prices in the Contractor's bid or the Agreement, a detailed change proposal shall be submitted by the Contractor on a Change Order Proposal (SC-6.312), or in such other format as the State Buildings Program approves, with which the Principal Representative may require an itemized list of materials, equipment and labor, indicating quantities, time and cost for completion of the changed Work.

Such detailed change proposals shall be stated in lump sum amounts and shall be supported by a separate breakdown, which shall include estimates of all or part of the following when requested by the Architect/Engineer or the Principal Representative:

1. Materials, indicating quantities and unit prices including taxes and delivery costs if any (separated where appropriate into general, mechanical and electrical and/or other Subcontractors' Work; and the Principal Representative may require in its discretion any significant subcontract costs to be similarly and separately broken down).
2. Labor costs, indicating hourly rates and time and labor burden to include Social Security and other payroll taxes such as unemployment, benefits and other customary burdens.
3. Costs of project management time and superintendence time of personnel stationed at the site, and other field supervision time, but only where a time extension, other than a weather delay, is

approved as part of the Change Order, and only where such project management time and superintendence time is directly attributable to and required by the change; provided however that additional cost of on-site superintendence shall be allowable whenever in the opinion of the Architect/Engineer the impact of multiple change requests to be concurrently performed will result in inadequate levels of supervision to assure a proper result unless additional superintendence is provided.

4. Construction equipment (including small tools). Expenses for equipment and fuel shall be based on customary commercially reasonable rental rates and schedules. Equipment and hand tool costs shall not include the cost of items customarily owned by workers.
5. Workers' compensation costs, if not included in labor burden.
6. The cost of commercial general liability and property damage insurance premiums but only to the extent charged the Contractor as a result of the changed Work.
7. Overhead and profit, as hereafter specified.
8. Builder's risk insurance premium costs.
9. Bond premium costs.
10. Testing costs not otherwise excluded by these General Conditions.
11. Subcontract costs.

Unless modified in the Supplementary General Conditions, overhead and profit shall not exceed the percentages set forth in the table below.

	OVERHEAD	PROFIT	COMMISSION
To the Contractor or to Subcontractors for the portion of Work performed with their own forces:	10%	5%	0%
To the Contractor or to Subcontractors for Work performed by others at a tier immediately below either of them:	5%	0%	5%

Overhead shall include: a) insurance premium for policies not purchased for the Project and itemized above, b) home office costs for office management, administrative and supervisory personnel and assistants, c) estimating and change order preparation costs, d) incidental job burdens, e) legal costs, f) data processing costs, g) interest costs on capital, h) general office expenses except those attributable to increased rental expenses for temporary facilities, and all other indirect costs, but shall not include the Social Security tax and other direct labor burdens. The term "Work" as used in the proceeding table shall include labor, materials and equipment and the "Commission" shall include all costs and profit for carrying the subcontracted Work at the tiers below except direct costs as listed in items 1 through 11 above if any.

On proposals for Work involving both additions and credits in the amount of the Contract sum, the overhead and profit will be allowed on the net increase only. On proposals resulting in a net deduct to the amount of the Contract sum, profit on the deducted amount shall be returned to the Principal Representative at fifty percent (50%) of the rate specified. The inadequacy of the profit specified shall not be a basis for refusal to submit a proposal.

Except in the case of Change Orders or Emergency Field Change Orders agreed to on the basis of a lump sum amount or unit prices as described in paragraphs 35A1 and 35A2 above, The Value of Changed Work, the Contractor shall keep and present a correct and fully auditable account of the several items of cost, together with vouchers, receipts, time cards and other proof of costs incurred, summarized on a Change Order form (SC-6.31) using such format for supporting documentation as the Principal Representative and State Buildings Program approve. This requirement applies equally to Work done by Subcontractors. Only auditable costs shall be reimbursable on Change Orders where the value is determined on the basis of actual cost plus a fixed fee pursuant to paragraph 35A3 above, or where unilaterally determined by the Principal Representative on the basis of an equitable adjustment

in accordance with the Procurement Rules, as described above in Article 35A, The Value Of Changed Work.

Except for proposals for Work involving both additions and credits, changed Work shall be adjusted and considered separately for Work either added or omitted. The amount of adjustment for Work omitted shall be estimated at the time it is directed to be omitted, and when reasonable to do so, the agreed adjustment shall be reflected on the schedule of values used for the next Contractor's application for payment.

The Principal Representative reserves the right to contract with any person or firm other than the Contractor for any or all extra Work; however, unless specifically required in the Contract Documents, the Contractor shall have no responsibility without additional compensation to supervise or coordinate the Work of persons or firms separately contracted by the Principal Representative.

C. HAZARDOUS MATERIALS

1. The Principal Representative represents that it has undertaken an examination of the site of the Work and has determined that there are no hazardous substances, as defined below, which the Contractor could reasonably encounter in its performance of the Work. In the event the Principal Representative so discovers hazardous substances, the Principal Representative shall render harmless such hazards before the Contractor commences the Work.

2. In the event the Contractor encounters any materials reasonably believed to be hazardous substances which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Principal Representative, in writing. For purposes of this Agreement, "hazardous substances" shall include asbestos, lead, polychlorinated biphenyl (PCB) and any or all of those substances defined as "hazardous substance", "hazardous waste", or "dangerous or extremely hazardous wastes" as those terms are used in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA), and shall also include materials regulated by the Toxic Substances Control Act (TSCA), the Clean Air Act, the Air Quality Act, the Clean Water Act, and the Occupational Safety and Health Act. The Work in the affected area shall not therefore be resumed except by written agreement of the Principal Representative and the Contractor, if in fact materials that are hazardous substances have not been rendered harmless. The Work in the affected area shall be resumed only in the absence of the hazardous substances or when it has been rendered harmless or by written agreement of the Principal Representative and the Contractor.

3. The contractor shall not be required to perform Work without consent in any areas where it reasonably believes hazardous substances that have not been rendered harmless are present.

D. EMERGENCY FIELD CHANGE ORDERED WORK

The Principal Representative, without invalidating the Agreement, and with the approval of State Buildings Program and without the approval of the State Controller, may order extra Work or make changes in the case of an emergency that is a threat to life or property or where the likelihood of delays in processing a normal Change Order will result in substantial delays and or significant cost increases for the Project. Emergency Field Orders are not to be used solely to expedite normal Change Order processing absent a clear showing of a high potential for significant and substantial cost or delay. Such changes in the Work may be directed through issuance of an Emergency Field Change Order signed by the Contractor, the Principal Representative (or by a designee specifically appointed to do so in writing), and approved by the Director of State Buildings Program or his or her delegate. The change shall be directed using an Emergency Field Change Order form (SC-6.31E).

If the amount of the adjustment of the Contract price and time for completion can be determined at the time of issuance of the Emergency Field Change Order, those adjustments shall be reflected on the

face of the Emergency Field Change Order. Otherwise, the Emergency Field Change Order shall reflect a not to exceed (NTE) amount for any schedule adjustment (increasing or decreasing the time for completion) and an NTE amount for any adjustment to Contract sum, which NTE amount shall represent the maximum amount of adjustment to which the Contractor will be entitled, including direct and indirect costs of changed Work, as well as any direct or indirect costs attributable to delays, inefficiencies or other impacts arising out of the change. Emergency Field Change Orders directed in accordance with this provision need not bear the approval signatures of the State Controller.

On Emergency Field Change Orders where the price and schedule have not been finally determined, the Contractor shall submit final costs for adjustment as soon as practicable. No later than seven (7) days after issuance, except as otherwise permitted, and every seven days thereafter, the Contractor shall report all costs to the Principal Representative and the Architect/Engineer. The final adjustment of the Emergency Field Change Order amount and the adjustment to the Project time for completion shall be prepared on a normal Change Order from (SC-6.31) in accordance with the procedures described in Article 35A, The Value of Changed Work, and B, Detailed Breakdown, above. Unless otherwise provided in writing signed by the Director of State Buildings Program to the Principal Representative and the Contractor, describing the extent and limits of any greater authority, individual Emergency Field Change Orders shall not be issued for more than $25,000, nor shall the cumulative value of Emergency Field Change Orders exceed an amount of $100,000.

E. APPROPRIATION LIMITATIONS - § 24-91-103.6, C.R.S., as amended

The amount of money appropriated, as shown on the Contractor's Design/Bid/Build Agreement (SC 6.21), is equal to or in excess of the Contract amount. No Change Order, Emergency Field Change Order, or other type of order or directive shall be issued by the Principal Representative, or any agent acting on his or her behalf, which directs additional compensable Work to be performed, which Work causes the aggregate amount payable under the Contract to exceed the amount appropriated for the original Contract, as shown on the Agreement (SC-6.21), unless one of the following occurs: (1) the Contractor is provided written assurance from the Principal Representative that sufficient additional lawful appropriations exist to cover the cost of the additional Work; or (2) the Work is covered by a contractor remedy provision under the Contract, such as a claim for extra cost. By way of example only, no assurance is required for any order, directive or instruction by the Architect/Engineer or the Principal Representative to perform Work which is determined to be within the performance required by the Contract Documents; the Contractor's remedy shall be as described elsewhere in these General Conditions.

Written assurance shall be in the form of an Amendment to the Contract reciting the source and amount of such appropriation available for the Project. No remedy granting provision of this Contract shall obligate the Principal Representative to seek appropriations to cover costs in excess of the amounts recited as available to pay for the Work to be performed.

ARTICLE 36. CLAIMS

It is the intent of these General Conditions to provide procedures for speedy and timely resolution of disagreements and disputes at the lowest level possible. In the spirit of on the job resolution of job site issues, the parties are encouraged to use the partnering processes of Article 2D, Partnering, Communications and Cooperation, before turning to the more formal claims processes described in this Article 36, Claims. The use of non-binding dispute resolution, whether through the formal processes described in Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, or through less formal alternative processes developed as part of a partnering plan, are also encouraged. Where such process cannot resolve the issues in dispute, the claims process that follows is intended to cause the issues to be presented, decided and where necessary, documented in close proximity to the events from which the issues arise. To that end, and in summary of the remedy granting process that follows commencing with the next paragraph of this Article 36, Claims, the Contractor shall 1) first, seek a decision by the Architect/Engineer, and 2) shall second, informally present the claim to Principal Representative as described hereafter, and 3) failing resolution in the field, give Notice of intent to exercise statutory rights of review of a formal contract controversy, and 4) seek resolution outside the Contract as provided by the Procurement Code.

If the Contractor claims that any instructions, by detailed drawings, or otherwise, or any other act or omission of the Architect/Engineer or Principal Representative affecting the scope of the Contractor's Work, involve extra cost, extra time or changes in the scope of the Work under this Contract, the Contractor shall have the right to assert a claim for such costs or time, provided that before either proceeding to execute such Work (except in an emergency endangering life or property), or filing a Notice of claim, the Contractor shall have obtained or requested a written decision of the Architect/Engineer following the procedures as provided in Article 6A and B, Architect/Engineer Decisions and Judgments, respectively; provided, however, that in the case of a directed change in the Work pursuant to Article 35, no written judgment or decision of the Architect/Engineer is required. If the Contractor is delayed by the lack of a response to a request for a decision by the Architect/Engineer, the Contractor shall give Notice in accordance with Article 38, Delays and Extensions of Time.

Unless it is the Architect/Engineer's judgment and determination that the Work is not included in the performance required by the Contract Documents, the Contractor shall proceed with the Work as originally directed. Where the Contractor's claim involves a dispute concerning the value of Work unilaterally directed pursuant to Article 35A2 the Contractor shall also proceed with the Work as originally directed while his or her claim is being considered.

The Contractor shall give the Principal Representative and the Architect/Engineer Notice of any claim promptly after the receipt of the Architect/Engineer's decision, but in no case later than three (3) business days after receipt of the Architect/Engineer's decision (or no later than ten (10) days from the date of the Contractor's request for a decision when the Architect/Engineer fails to decide as provided in Article 6). The Notice of claim shall state the grounds for the claim and the amount of the claim to the extent known in accordance with the procedures of Article 35, Changes In The Work. The period in which Notice must be given may be extended by the Principal Representative if requested in writing by the Contractor with good cause shown, but any such extension to be effective shall be in writing.

The Principal Representative shall respond in writing, with a copy to the Architect/Engineer, within a reasonable time, and except where a request for facilitation of negotiation has been made as hereafter provided, in no case later than seven (7) business days (or at such other time as the Contractor and Principal Representative agree) after receipt of the Contractor's Notice of claim regarding such instructions or alleged act or omission. If no response to the Contractor's claim is received within seven (7) business days of Contractor's Notice (or at such other time as the Contractor and Principal Representative agree) and the instructions have not been retracted, it shall be deemed that the Principal Representative has denied the claim.

The Principal Representative may grant or deny the claim in whole or in part, and a Change Order shall be issued if the claim is granted. To the extent any portion of claim is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the Work be determined by any method allowed in Article 35A, The Value of Changed Work. Except in the case of a deemed denial, the Principal Representative shall provide a written explanation regarding any portion of the Contractor's claim that is denied.

If the Contractor disagrees with the Principal Representative's judgment and determination on the claim and seeks an equitable adjustment of the Contract sum or time for performance, he or she shall give Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy within ten (10) days of receipt of the Principal Representative's decision denying the claim. A "contract controversy," as such term is used in the Colorado Procurement Code, § 24-109-106, C.R.S., shall not arise until the initial claim process described above in this Article 36 has been properly exhausted by the Contractor. The Contractor's failure to proceed with Work directed by the Architect/Engineer or to exhaust the claim process provided above in this Article 36, shall constitute an abandonment of the claim by the Contractor and a waiver of the right to contest the decision in any forum.

At the time of filing the Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy, the Contractor may request that the Principal Representative defer a decision on the contract controversy until a later date or until the end of the Project. If the Principal Representative agrees, he or she shall so advise the Contractor in writing. If no such request is made, or if the Principal Representative does

not agree to such a request, the Principal Representative shall render a written decision within twenty (20) business days and advise the Contractor of the reasons for any denial. Unless the claim has been decided by the Principal Representative (as opposed to delegates of the Principal Representative), the person who renders the decision on this statutory contract controversy shall not be the same person who decided the claim. To the extent any portion of the contract controversy is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the Work be determined by any method allowed in Article 35A, The Value of Changed Work. In the event of a denial the Principal Representative shall give Notice to the Contractor of his or her right to administrative and judicial reviews as provided in the Colorado Procurement Code, § 24-109-201 *et seq*, C.R.S., as amended. If no decision regarding the contract controversy is issued within twenty (20) business days of the Contractor's giving Notice (or such other date as the Contractor and Principal Representative have agreed), and the instructions have not been retracted or the alleged act or omission have not been corrected, it shall be deemed that the Principal Representative has ruled by denial on the contract controversy. Except in the case of a deemed denial, the Principal Representative shall provide an explanation regarding any portion of the contract controversy that involves denial of the Contractor's claim.

Either the Contractor or the Principal Representative may request facilitation of negotiations concerning the claim or the contract controversy, and if requested, the parties shall consult and negotiate before the Principal Representative decides the issue. Any request for facilitation by the Contractor shall be made at the time of the giving of Notice of the claim or Notice of the contract controversy. Facilitation shall extend the time for the Principal Representative to respond by commencing the applicable period at the completion of the facilitated negotiation, which shall be the last day of the parties' meeting, unless otherwise agreed in writing.

Disagreement with the decision of the Architect Engineer, or the decision of the Principal Representative to deny any claim or denying the contract controversy, shall not be grounds for the Contractor to refuse to perform the Work directed or to suspend or terminate performance. During the period that any claim or contract controversy decision is pending under this Article 36, Claims, the Contractor shall proceed diligently with the Work directed.
In all cases where the Contractor proceeds with the Work and seeks equitable adjustment by filing a claim and or statutory appeal, the Contractor shall keep a correct account of the extra cost, in accordance with Article 35B, Detailed Breakdown supported by receipts. The Principal Representative shall be entitled to reject any claim or contract controversy whenever the foregoing procedures are not followed and such accounts and receipts are not presented.

The payments to the Contractor in respect of such extra costs shall be limited to reimbursement for the current additional expenditure by the Contractor made necessary by the change in the Work, plus a reasonable amount for overhead and profit, determined in accordance with Article 35B, Detailed Breakdown, determined solely with reference to the additional Work, if any, required by the change.

ARTICLE 37. DIFFERING SITE CONDITIONS

A. NOTICE IN WRITING

The Contractor shall promptly, and where possible before conditions are disturbed, give the Architect/Engineer and the Principal Representative Notice in writing of:

1. subsurface or latent physical conditions at the site differing materially from those indicated in or reasonably assumed from the information provided in the Contract Documents; and,
2. unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents.

The Architect/Engineer shall promptly investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Contractor 's costs of performance of any part of the Work required by the Contract Documents, whether or not such Work is changed as a result of such conditions, an equitable adjustment shall be made and the Contract sum shall be modified in accordance with Article 35, Changes In The Work.

If the time required for completion of the Work affected by such materially differing conditions will extend the Work on the critical path as indicated on the CPM schedule, the time for completion shall also be equitably adjusted.

B. LIMITATIONS

No claim of the Contractor under this clause shall be allowed unless the Contractor has given the Notice required in Article 37A, Notice In Writing, above. The time prescribed for presentation and adjustment in Articles 36, Claims and 38, Delays And Extensions Of Time, shall be reasonably extended by the State to the extent required by the nature of the differing conditions; provided, however, that even when so extended no claim by the Contractor for an equitable adjustment hereunder shall be allowed if not quantified and presented prior to the date the Contractor requests a final inspection pursuant to Article 41A, Notice Of Completion.

ARTICLE 38. DELAYS AND EXTENSIONS OF TIME

If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the State of Colorado or the Architect/Engineer, or of any employee or agent of either, or by any separately employed Contractor or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any other causes beyond the Contractor's control, including weather delays as defined below, the time of Completion of the Work shall be extended for a period equal to such portion of the period of delays directly affecting the completion of the Work as the Contractor shall be able to show he or she could not have avoided by the exercise of due diligence.

The Contractor shall provide Notice in writing to the Architect/Engineer, the Principal Representative and State Buildings Program within three (3) business days from the beginning of such delay and shall file a written claim for an extension of time within seven (7) business days after the period of such delay has ceased, otherwise, any claim for an extension of time is waived.

Provided that the Contractor has submitted reasonable schedules for approval when required by Article 12, Requests for Information and Schedules, if no schedule is agreed to fixing the dates on which the responses to requests for information or detail drawings will be needed, or Shop Drawings, Product Data or Samples are to be reviewed as required or allowed by Article 12B, Schedules, no extension of time will be allowed for the Architect/ Engineer's failure to furnish such detail drawings as needed, or for the failure to initially review Shop Drawings, Product Data or Samples, except in respect of that part of any delay in furnishing detail drawings or instructions extending beyond a reasonable period after written demand for such detailed drawings or instructions is received by the Architect/Engineer. In any event, any claim for an extension of time for such cause will be recognized only to the extent of delay directly caused by failure to furnish detail drawings or instructions or to review Shop Drawings, Product Data or Samples pursuant to schedule, after such demand.

All claims for extension of time due to a delay claimed to arise or result from ordered changes in the scope of the Work, or due to instructions claimed to increase the scope of the Work, shall be presented to the Architect/Engineer, the Principal Representative and State Buildings Program as part of a claim for extra cost, if any, in accordance with Article 36, Claims, and in accordance with the Change Order procedures required by Article 35, Changes In The Work.

Except as otherwise provided in this paragraph, no extension of time shall be granted when the Contractor has failed to utilize a CPM schedule or otherwise identify the Project's critical path as specified in Article 12, Requests for Information and Schedules, or has elected not to do so when allowed by the Supplementary General Conditions or the Specifications to use less sophisticated scheduling tools, or has failed to maintain such a schedule. Delay directly affecting the completion of the Work shall result in an extension of time only to the extent that completion of the Work was affected by impacts to the critical path shown on Contractor's CPM schedule. Where the circumstances make it indisputable in the opinion of the Architect/Engineer that the delay affected the completion of the Work so directly that the additional notice of the schedule impact by reference to a CPM schedule was unnecessary, a reasonable extension of time may be granted.

Extension of the time for completion of the Work will be granted for delays due to weather conditions only when the Contractor demonstrates that such conditions were more severe and extended than those reflected

by the ten-year average for the month, as evidenced by the Climatological Data, U. S. Department of Commerce, for the Project area.

Extensions of the time for completion of the Work due to weather will be granted on the basis of one and three tenths (1.3) calendar days for every day that the Contractor would have Worked but was unable to Work, with each separate extension figured to the nearest whole calendar day.

For weather delays and delays caused by events, acts or omissions not within the control of the Principal Representative or any person acting on the Principal Representative's behalf, the Contractor shall be entitled to an extension of time only and shall not be entitled to recovery of additional cost due to or resulting from such delays. This Article does not, however, preclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS

The Contractor and Principal Representative agree to designate one or more mutually acceptable persons willing and able to facilitate negotiations and communications for the resolution of conflicts, disagreements or disputes between them at the specific request of either party with regard to any Project decision of either of them or any decision of the Architect/Engineer. The designation of such person(s) shall not carry any obligation to use their services except that each party agrees that if the other party requests the intervention of such person(s) with respect to any such conflict, dispute or disagreement, the non-requesting party shall participate in good faith attempts to negotiate a resolution of the issue in dispute. If the parties cannot agree on a mutually acceptable person to serve in this capacity one shall be so appointed; provided, however, that either party may request the director of State Buildings Program to appoint such a person, who, if appointed, shall be accepted for this purpose by both the Contractor and the Principal Representative.

The cost, if any, of the facilitative services of the person(s) so designated shall be shared if the parties so agree in any partnering plan; or in the absence of agreement the cost shall be borne by the party requesting the facilitation of negotiation.

Any dispute, claim, question or disagreement arising from or relating to the Contract or an alleged breach of the Contract may be subject to a request by either party for facilitated negotiation subject to the limitations hereafter listed, and the parties shall participate by consultation and negotiation with each other, as guided by the facilitator and with recognition of their mutual interests, in an attempt to reach an equitable solution satisfactory to both parties.

The obligation to participate in facilitated negotiations shall be as described above and elsewhere in these General Conditions, as by way of example in Article 36, Claims, or Article 34, Deductions for Uncorrected Work and to the extent not more particularly described or limited elsewhere, each party's obligations shall be as follows:

1. a party shall not initiate communication with the facilitator regarding the issues in dispute; except that any request for facilitation shall be made in writing with copies sent, faxed or delivered to the other party;
2. a party shall prepare a brief written description of its position if so requested by the facilitator (who may elect to first discuss the parties' positions with each party separately in the interest of time and expense);
3. a party shall respond to any reasonable request for copies of documents requested by the facilitator, but such requests, if voluminous, may consist of an offer to allow the facilitator access to the parties' documents;
4. a party shall review any meeting agenda proposed by a facilitator and endeavor to be informed on the subjects to be discussed;
5. a party shall meet with the other party and the facilitator at a mutually acceptable place and time, or, if none can be agreed to, at the time and place designated by the facilitator for a period not to exceed four hours unless the parties agree to a longer period;

6. a party shall endeavor to assure that any facilitation meeting shall be attended by any other persons in their employ that the facilitator requests be present, if reasonably available, including the Architect/Engineer;
7. each party shall participate in such facilitated face-to-face negotiations of the issues in dispute through persons fully authorized to resolve the issue in dispute;
8. each party shall be obligated to participate in negotiations requested by the other party and to perform the specific obligations described in paragraphs (1) through (10) this Article 39, Facilitated Negotiation, no more than three times during the course of the Project;
9. neither party shall be under any obligation to resolve any issue by facilitated negotiation, but each agrees to participate in good faith and the Principal Representative shall direct the Architect/Engineer to appropriately document any resolution or agreement reached and to execute any Amendment or Change Order to the Contract necessary to implement their agreement; and,
10. any discussions and documents prepared exclusively for use in the negotiations shall be deemed to be matters pertaining to settlement negotiations and shall not be subsequently available in further proceedings except to the extent of any documented agreement.

In accordance with State Fiscal Rules and Article 52F, Choice of Law; No Arbitration, nothing in this Article 39 shall be deemed to call for arbitration or otherwise obligate the State to participate in any form of binding alternative dispute resolution.

A partnering plan developed as described in Article 2D, Communications and Cooperation, may modify or expand the requirements of this Article but may not reduce the obligation to participate in facilitated negotiations when applicable. In the case of small projects estimated to be valued under $500,000, the requirements of this Article may be deleted from this Contract, by modification in Article 7 (Contractor's Agreement SC-6.21), Optional Provisions And Elections. When so modified, the references to the parties' right to elect facilitated negotiation elsewhere in these General Conditions shall be deleted.

ARTICLE 40. RIGHT OF OCCUPANCY

The Principal Representative shall have the right to take possession of and to use any completed or partially completed portions of the Work, even if the time for completing the entire Work or portions of the Work has not expired and even if the Work has not been finally accepted, and the Contractor shall fully cooperate with the Principal Representative to allow such possession and use. Such possession and use shall not constitute an acceptance of such portions of the Work.

Prior to any occupancy of the Project, an inspection shall be made by the Principal Representative, State Buildings Program and the Contractor. Such inspection shall be made for the purpose of ensuring that the building is secure, protected by operation safety systems as designed, operable exits, power, lighting and HVAC systems, and otherwise ready for the occupancy intended and the Notice of Substantial Completion has been issued for the occupancy intended. The inspection shall also document existing finish conditions to allow assessment of any damage by occupants. The Contractor shall assist the Principal Representative in completing and executing State Form SBP-01, Approval of Occupancy/Use, prior to the Principal Representative's possession and use. Any and all areas so occupied will be subject to a final inspection when the Contractor complies with Article 41, Completion, Final Inspection, Acceptance and Settlement.

ARTICLE 41. COMPLETION, FINAL INSPECTION, ACCEPTANCE AND SETTLEMENT

A. NOTICE OF COMPLETION

When the Work, or a discrete physical portion of the Work (as hereafter described) which the Principal Representative has agreed to accept separately, is substantially complete and ready for final inspection, the Contractor shall file a written Notice with the Architect/Engineer that the Work, or such discrete physical portion, in the opinion of the Contractor, is substantially complete under the terms of the Contract. The Contractor shall prepare and submit with such Notice a comprehensive list of items to be completed or corrected prior to final payment, which shall be subject to review and additions as the Architect/Engineer or the Principal Representative shall determine after inspection. If the Architect/Engineer or the Principal Representative believe that any of the items on the list of items submitted, or any other item of Work to be corrected or completed, or the cumulative number of items

of Work to be corrected or completed, will prevent a determination that the Work is substantially complete, those items shall be completed by the Contractor and the Notice shall then be resubmitted.

B. FINAL INSPECTION

Within ten (10) days after the Contractor files written Notice that the Work is substantially complete, the Architect/Engineer, the Principal Representative, and the Contractor shall make a “final inspection” of the Project to determine whether the Work is substantially complete and has been completed in accordance with the Contract Documents. State Buildings Program shall be notified of the inspection not less than three (3) business days in advance of the inspection. The Contractor shall provide the Principal Representative and the Architect/Engineer an updated punch list in sufficient detail to fully outline the following:

1. Work to be completed, if any; and
2. Work not in compliance with the Drawings or Specifications, if any.

A final punch list shall be made by the Architect/Engineer in sufficient detail to fully outline to the Contractor:

1. Work to be completed, if any;
2. Work not in compliance with the Drawings or Specifications, if any; and
3. unsatisfactory Work for any reason, if any.

The required number of copies of the final punch list will be countersigned by the authorized representative of the Principal Representative and will then be transmitted by the Architect/Engineer to the Contractor, the Principal Representative, and State Buildings Program. The Architect/Engineer's final punch list shall control over the Contractor's preliminary punch list.

C. NOTICE OF SUBSTANTIAL COMPLETION

Notice of Substantial Completion shall establish the date of substantial completion of the Project. The Contractor acknowledges and agrees that because the departments, agencies and institutions of the State of Colorado are generally involved with the business of the public at large, greater care must be taken in establishing the date of substantial completion than might otherwise be the case to ensure that a project or building or discrete physical portion of the Work is fully usable and safe for public use, and that such care necessarily raises the standard by which the concept of substantial completion is applied for a public building.

The Notice of Substantial Completion shall not be issued until the following have been fully established:

1. All required building code inspections have been called for and the appropriate code officials have affixed their signatures to the Building Inspection Record indicating successful completion of all required code inspections;
2. All required corrections noted on the Building Inspection Record shall have been completed unless the Architect/Engineer, the Principal Representative and State Buildings Program, in their complete and absolute discretion, all concur that the condition requiring the remaining correction is not in any way life threatening, does not otherwise endanger persons or property, and does not result in any undue inconvenience or hardship to the Principal Representative or the public;
3. The building, structure or Project can be fully and comfortably used by the Principal Representative and the public without undue interference by the Contractor’s employees and Workers during the completion of the final punch list taking into consideration the nature of the public uses intended and taking into consideration any stage or level of completion of HVAC system commissioning or other system testing required by the Specifications to be completed prior to issuance of the Notice of Substantial Completion;
4. The Project has been fully cleaned as required by these General Conditions, and as required by any stricter requirements of the Specifications, and the overall state of completion is appropriate for presentation to the public; and

5. The Contractor has provided a schedule for the completion of each and every item identified on the punch list which specifies the Subcontractor or trade responsible for the Work, and the dates the completion or correction of the item will be commenced and finished; such schedule will show completion of all remaining final punch list items within the period indicated in the Contract for final punch list completion prior to Final Acceptance, with the exception of only those items which are beyond the control of the Contractor despite due diligence. The schedule shall provide for a reasonable punch list inspection process. Unless liquidated damages have been specified in Article 7.4 of the Contractor's Design/Bid/Build Agreement SC-6.21), the cost to the Principal Representative, if any, for re-inspections due to failure to adhere to the Contractor's proposed punch-list completion schedule shall be the responsibility of the Contractor and may be deducted by the Principal Representative from final amounts due to the Contractor.

Substantial completion of the entire Project shall not be conclusively established by a decision by the Principal Representative to take possession and use of a portion, or all of the Project, where portions of the Project cannot meet all the criteria noted above. Notice of Substantial Completion for the entire Project shall, however, only be withheld for substantial reasons when the Principal Representative has taken possession and uses all of the Project in accordance with the terms of Article 40, Right Of Occupancy. Failure to furnish the required completion schedule shall constitute a substantial reason for withholding the issuance of any Notice of Substantial Completion.

The Contractor shall have the right to request a final inspection of any discrete physical portion of the Project when in the opinion of the Principal Representative, The Architect/Engineer and State Buildings Program a final punch list can be reasonably prepared, without confusion as to which portions of the Project are referred to in any subsequent Notice of Partial Final Settlement which might be issued after such portion is finally accepted. Discrete physical portions of the Project may be, but shall not necessarily be limited to, such portions of the Project as separate buildings where a Project consists of multiple buildings. Similarly, an addition to an existing building where the Project also calls for renovation or remodeling of the existing building may constitute a discrete physical portion of the Project. In such circumstances, when in the opinion of the Principal Representative, the Architect/Engineer and State Buildings Program, the requirements for issuance of a Notice of Substantial Completion can be satisfied with respect to the discrete portion of the Project, a partial Notice of Substantial Completion may be issued for such discrete physical portion of the Project.

D. NOTICE OF ACCEPTANCE

The Notice of Acceptance shall establish the completion date of the Project. It shall not be authorized until the Contractor shall have performed all of the Work to allow completion and approval of the Pre-Acceptance Checklist (SBP-05).

Where partial Notices of Substantial Completion have been issued, partial Notices of Final Acceptance may be similarly issued when appropriate for that portion of the Work. Partial Notice of Final Acceptance may also be issued to exclude the Work described in Change Orders executed during late stages of the Project where a later completion date for the Change Ordered Work is expressly provided for in the Contract as amended by the Change Order, provided the Work can be adequately described to allow partial advertisement of any Notice of Partial Final Settlement to be issued without confusion as to the Work included for which final payment will be made.

E. SETTLEMENT

Final payment and settlement shall be made on the date fixed and published for such payment except as hereafter provided. The Principal Representative shall not authorize final payment until all items on the Pre-Acceptance check list (SBP-05) have been completed, the Notice of Acceptance issued, and the Notice of Contractors Settlement published. If the Work shall be substantially completed, but Final Acceptance and completion thereof shall be prevented through delay in correction of minor defects, or unavailability of materials or other causes beyond the control of the Contractor, the Principal Representative in his or her discretion may release all amounts due to the Contractor except such amounts as may be in excess of three times the cost of completing the unfinished Work or the cost of correcting the defective Work, as estimated by the Architect/Engineer and approved by State Buildings

Program. Before the Principal Representative may issue the Notice of Contractor's Settlement and advertise the Project for final payment, the Contractor shall have corrected all items on the punch list except those items for which delayed performance is expressly permitted, subject to withholding for the cost thereof, and shall have:

1. Delivered to the Principal Representative:

    a. All guarantees and warranties;
    b. All statements to support local sales tax refunds, if any;
    c. Required operating maintenance instructions as per the Principal Representative; and,
    d. One (1) set of hard copy as-built Contract Documents, and one (1) electronic copy showing all job changes.

2. Demonstrated to the operating personnel of the Principal Representative the proper operation and maintenance of all equipment.

3. Delivered to the State of Colorado Department of Personnel & Administration in accordance with C.R.S. § 24-103-210:

    a. A written disclosure of the five most costly goods incorporated into the project, including iron, steel, or related manufactured goods and the total cost and country of origin of those five goods and whether the project was subject to any existing domestic content preferences.

Upon completion of the foregoing the Project shall be advertised in accordance with the Notice of Contractor's Settlement by two publications of Notice, the last publication appearing at least ten (10) days prior to the time of final settlement. Publication and final settlement should not be postponed or delayed solely by virtue of unresolved claims against the Project or the Contractor from Subcontractors, suppliers or materialmen based on good faith disputes; the resolution of the question of payment in such cases being directed by statute.

Except as hereafter provided, on the date of final settlement thus advertised, provided the Contractor has submitted a written Notice to the Architect/Engineer that no claims have been filed, and further provided the Principal Representative shall have received no claims, final payments and settlement shall be made in full. If any unpaid claim for labor, materials, rental machinery, tools, supplies or equipment is filed before payment in full of all sums due the Contractor, the Principal Representative and the State Controller shall withhold from the Contractor on the date established for final settlement, sufficient funds to insure the payment of such claim, until the same shall have been paid or withdrawn, such payment or withdrawal to be evidenced by filing a receipt in full or an order for withdrawal signed by the claimant or his or her duly authorized agent or assignee. The amount so withheld may be in the amount of 125% of the claims or such other amount as the Principal Representative reasonably deems necessary to cover expected legal expenses. Such withheld amounts shall be in addition to any amount withheld based on the cost to compete unfinished Work or the cost to repair defective Work. However, as provided by statute, such funds shall not be withheld longer than ninety (90) days following the date fixed for final settlement with the Contractor, as set forth in the published Notice of Contractor's Settlement, unless an action at law shall be commenced within that time to enforce such unpaid claim and a Notice of such action at law shall have been filed with the Principal Representative and the State Controller. At the expiration of the ninety (90) day period, the Principal Representative shall authorize the State Controller to release to the Contractor all other money not the subject of such action at law or withheld based on the cost to compete unfinished Work or the cost to repair defective Work.

Notices of Partial Final Settlement may be similarly advertised, provided all conditions precedent have been satisfied as though that portion of the Work affected stood alone, a Notice of Partial Acceptance has been issued, and the consent of surety to the partial final settlement has been obtained in writing. Thereafter, partial final payments may be made to the Contractor subject to the same conditions regarding unpaid claims.

ARTICLE 42. GENERAL WARRANTY AND CORRECTION OF WORK AFTER ACCEPTANCE

The Contractor warrants that the materials used and the equipment furnished shall be new and of good quality unless specified to the contrary. The Contractor further warrants that the Work shall, in all respects, be free from material defects not permitted by the Specifications and shall be in accordance with the requirements of the Contract Documents. Neither the final certificate for payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for defects or faulty materials or Workmanship. The Contractor shall be responsible to the Principal Representative for such warranties for the longest period permitted by any applicable statute of limitations.

In addition to these general warranties, and without limitation of these general warranties, for a period of one year after the date of any Notice of Substantial Completion, or any Notice of Partial Substantial Completion if applicable, the Contractor shall remedy defects, and faulty Workmanship or materials, and Work not in accordance with the Contract Documents which was not accepted at the time of the Notice of Final Acceptance, all in accordance with the provisions of Article 44, One-Year Guarantee And Special Guarantees And Warranties.

ARTICLE 43. LIENS

Colorado statutes do not provide for any right of lien against public buildings. In lieu thereof, § 38-26-107, C.R.S., provides adequate relief for any claimant having furnished labor, materials, rental machinery, tools, equipment, or services toward construction of the particular public Work in that final payment may not be made to a Contractor until all such creditors have been put on Notice by publication in the public press of such pending payment and given opportunity for a period of up to ninety (90) days to stop payment to the Contractor in the amount of such claims.

ARTICLE 44. ONE-YEAR GUARANTEE AND SPECIAL GUARANTEES AND WARRANTIES

C. A. ONE-YEAR GUARANTEE OF THE WORK

The Contractor shall guarantee to remedy defects and repair or replace the Work for a period of one year from the date of the Notice of Substantial Completion or from the dates of any partial Notices of Substantial Completion issued for discrete physical portions of the Work. The Contractor shall remedy any defects due to faulty materials or Workmanship and shall pay for, repair and replace any damage to other Work resulting there from, which shall appear within a period of one year from the date of such Notice(s) of Substantial Completion. The Contractor shall also remedy any deviation from the requirements of the Contract Documents which shall later be discovered within a period of one year from the date of the Notice of Substantial Completion; provided, however, that the Contractor shall not be required to remedy deviations from the requirements of the Contract Documents where such deviations were obvious, apparent and accepted by the Architect/Engineer or the Principal Representative at the time of the Notice of Final Acceptance. The Principal Representative shall give Notice of observed defects or other Work requiring correction with reasonable promptness. Such Notice shall be in writing to the Architect/Engineer and the Contractor.

The one year guarantee of the Contractor's Work may run separately for discrete physical portions of the Work for which partial Notices of Substantial Completion have been issued, however, it shall run from the last Notice of Substantial Completion with respect to all or any systems common to the Work to which more than one Notice of Substantial Completion may apply.

This one-year guarantee shall not be construed to limit the Contractor's general warranty described in Article 42, General Warranty and Correction of Work After Acceptance, that all materials and equipment are new and of good quality, unless specified to the contrary, and that the Work shall in all respects be free from material defects not permitted by the Specifications and in accordance with the requirements of the Contract Documents.

B. SPECIAL GUARANTEES AND WARRANTIES

In case of Work performed for which product, manufacturers or other special warranties are required by the Specifications, the Contractor shall secure the required warranties and deliver copies thereof to the Principal Representative through the Architect/Engineer upon completion of the Work.

These product, manufacturers or other special warranties, as such, do not in any way lessen the Contractor's responsibilities under the Contract. Whenever guarantees or warranties are required by the Specifications for a longer period than one year, such longer period shall govern.

ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION

The Architect/Engineer, the Principal Representative and the Contractor together shall make at least two (2) complete inspections of the Work after the Work has been determined to be substantially complete and accepted. One such inspection, the "Six-Month Guarantee Inspection," shall be made approximately six (6) months after date of the Notice of Substantial Completion, unless in the case of smaller projects valued under $500,000 this inspection is declined in Article 7A (Contractor's Agreement SC-6.21), Modification of Article 45, in which case the inspection to occur at six months shall not be required. Another such inspection, the "Eleven-Month Guaranty Inspection" shall be made approximately eleven (11) months after the date of the Notice of Substantial Completion. The Contractor shall schedule and so notify all parties concerned, and the Principal Representative shall so notify State Buildings Program, of these inspections. If more than one Notice of Substantial Completion has been issued at the reasonable discretion of the Principal Representative separate eleven month inspections may be required where the one year guarantees do not run reasonably concurrent.

Written punch lists and reports of these inspections shall be made by the Architect/Engineer and forwarded to the Contractor, the Principal Representative, State Buildings Program, and all other participants within ten (10) days after the completion of the inspections. The punch list shall itemize all guarantee items, prior punch list items still to be corrected or completed and any other requirements of the Contract Documents to be completed which were not waived by final acceptance because they were not obvious or could not reasonably have been previously observed. The Contractor shall immediately initiate such remedial Work as may be necessary to correct any deficiencies or defective Work shown by this report, and shall promptly complete all such remedial Work in a manner satisfactory to the Architect/Engineer, the Principal Representative and State Buildings Program.

If the Contractor fails to promptly correct all deficiencies and defects shown by this report, the Principal Representative may do so, after giving the Contractor ten (10) days written Notice of intention to do so.

The State of Colorado, acting by and through the Principal Representative, shall be entitled to collect from the Contractor all costs and expenses incurred by it in correcting such deficiencies and defects, as well as all damages resulting from such deficiencies and defects.

ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES

It is hereby understood and mutually agreed, by and between the parties hereto, that the date of beginning, rate of progress, and the time for completion of the Work to be done hereunder are ESSENTIAL CONDITIONS of this Agreement, and it is understood and agreed that the Work embraced in this Contract shall be commenced at the time specified in the Notice to Proceed (SC-6.26).

It is further agreed that time is of the essence of each and every portion of this Contract, and of any portion of the Work described on the Drawings or Specifications, wherein a definite and certain length of time is fixed for the performance of any act whatsoever. The parties further agree that where under the Contract additional time is allowed for the completion of the Work or any identified portion of the Work, the new time limit or limits fixed by such extension of the time for completion shall be of the essence of this Agreement.

The Contractor acknowledges that subject to any limitations in the Advertisement for Bids, issued for the Project, the Contractor's bid is consistent with and considers the number of days to substantially complete the Project and the number of days to finally complete the Project to which the parties may have stipulated in the Agreement, which stipulation was based on the Contractor's bid. The Contractor agrees that Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure the Project will be substantially complete, and fully and finally complete, as recognized by the issuance of all required Notices of Substantial Completion and Notices of Final Acceptance, within any times stipulated and specified in the Agreement, as the same may be amended by Change Order or other written modification, and that the Principal Representative will be damaged if the times of completion are delayed.

It is expressly understood and agreed, by and between the parties hereto, that the times for the Substantial Completion of the Work or for the final acceptance of the Work as may be stipulated in the Agreement, and as applied here and in Article 7.4 of the Contractor's Design/Bid/Build Agreement SC-6.21), Modifications of Article 46, are reasonable times for these stages of completion of the Work, taking into such consideration all factors, including the average climatic range and usual industrial conditions prevailing in the locality of the building operations.

If the Contractor shall neglect, fail or refuse to complete the Work within the times specified in the Agreement, such failure shall constitute a breach of the terms of the Contract and the State of Colorado, acting by and through the Principal Representative, shall be entitled to liquidated damages for such neglect, failure or refusal, as specified in Article 7.4 of the Contractor's Design/Bid/Build Agreement SC-6.21, Modification of Article 46.

The Contractor and the Contractor's Surety shall be jointly liable for and shall pay the Principal Representative, or the Principal Representative may withhold, the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the entire Project is 1) substantially completed, and the Notice (or all Notices) of Substantial Completion are issued, 2) finally complete and accepted and the Notice (or all Notices) of Acceptance are issued, or 3) both. Delay in substantial completion shall be measured from the Date of the Notice to Proceed and delay in final completion and acceptance shall be measured from the Date of the Notice of Substantial Completion.
In the first instance, specified in Article 7.4.1 of the Contractor's Design/Bid/Build Agreement SC-6.21, Modification of Article 46, liquidated damages, if any, shall be the amount specified therein, for each calendar day of delay beginning after the stipulated number of days for Substantial Completion from the date of the Notice to Proceed, until the date of the Notice of Substantial Completion. Unless otherwise specified in any Supplementary General Conditions, in the event of any partial Notice of Substantial Completion, liquidated damages shall accrue until all required Notices of Substantial Completion are issued.

In the second instance, specified in Article 7.4.2 of the Contractor's Design/Bid/Build Agreement SC-6.21, Modification of Article 46, liquidated damages, if any, shall be the amount specified in Article 7.4.2 of the Contractor's Design/Bid/Build Agreement SC-6.21, Modification of Article 46, for each calendar day in excess of the number of calendar days specified in the Contractor's bid for the Project and stipulated in the Agreement to finally complete the Project (as defined by the issuance of the Notice of Acceptance) after the final Notice of Substantial Completion has been issued.

In the third instance, when so specified in both Articles 7.4.1 and 7.4.2 of the Contractor's Agreement SC-6.21, both types of liquidated damages shall be separately assessed where those delays have occurred.

The parties expressly agree that said amounts are a reasonable estimate of the presumed actual damages that would result from any of the breaches listed, and that any liquidated damages that are assessed have been agreed to in light of the difficulty of ascertaining the actual damages that would be caused by any of these breaches at the time this Contract was formed; the liquidated damages in the first instance representing an estimate of damages due to the inability to use the Project; the liquidated damages in the second instance representing an estimate of damages due to the additional administrative, technical, supervisory and professional expenses related to and arising from the extended closeout period including delivery of any or all guarantees and warranties, the submittals of sales and use tax payment forms, the calling for the final inspection and the completion of the final punch list.

The parties also agree and understand that the liquidated damages to be assessed in each instance are separate and distinct, although potentially cumulative, damages for the separate and distinct breaches of delayed substantial completion or final acceptance. Such liquidated damages shall not be avoided by virtue of the fact of concurrent delay caused by the Principal Representative, or anyone acting on behalf of the Principal Representative, but in such event the period of delay for which liquidated damages are assessed shall be equitably adjusted in accordance with Article 38, Delays And Extensions Of Time.

ARTICLE 47. DAMAGES

If either party to this Contract shall suffer damage under this Contract in any manner because of any wrongful act or neglect of the other party or of anyone employed by either of them, then the party suffering damage shall be reimbursed by the other party for such damage. Except to the extent of damages liquidated for the Contractor's failure to achieve timely completion as set forth in Article 46, Time of Completion and Liquidated Damages, the Principal Representative shall be responsible for, and at his or her option may insure against, loss of use of any existing property not included in the Work, due to fire or otherwise, however caused. Notwithstanding the foregoing, or any other provision of this Contract, to the contrary, no term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions of the Colorado Governmental Immunity Act, Section 24-10-101, *et seq.*, CRS, as now or hereafter amended. The parties understand and agree that liability for claims for injuries to persons arising out of negligence of the State of Colorado, its departments, institutions, agencies, boards, officials and employees is controlled and limited by the provisions of Section 24-101-101, *et seq.*, CRS, as now or hereafter amended and the risk management statutes, Section 24-30-1501, *et seq.*, CRS, as now or hereafter amended.

Notice of intent to file a claim under this clause shall be made in writing to the party liable within a reasonable time of the first observance of such damage and not later than the time of final payment, except that in the case of claims by the Principal Representative involving warranties against faulty Work or materials Notice shall be required only to the extent stipulated elsewhere in these General Conditions. Claims made to the Principal Representative involving extra cost or extra time arising by virtue of instructions to the Contractor to which Article 36, Claims, applies shall be made in accordance with Article 36. Other claims arising under the Contract involving extra cost or extra time which are made to the Principal Representative under this clause shall also be made in accordance with the procedures of Article 36, whether or not arising by virtue of instructions to the Contractor; provided however that it shall not be necessary to first obtain or request a written judgment of the Architect/Engineer.

Provided written Notice of intent to file a claim is provided as required in the preceding paragraph, nothing in this Article shall limit or restrict the rights of either party to bring an action at law or to seek other relief to which either party may be entitled, including consequential damages, if any, and shall not be construed to limit the time during which any action might be brought. Nothing in these General Conditions shall be deemed to limit the period of time during which any action may be brought as a matter of contract, tort, warranty or otherwise, it being the intent of the parties to allow any and all actions at law or in equity for such periods as the law permits. All such rights shall, however be subject to the obligation to assert claims and to appeal denials pursuant to Article 36, Claims, where applicable.

ARTICLE 48. STATE'S RIGHT TO DO THE WORK; TEMPORARY SUSPENSION OF WORK; DELAY DAMAGES

A. STATE'S RIGHT TO DO THE WORK

If after receipt of Notice to do so, the Contractor should neglect to prosecute the Work properly or fail to perform any provision of the Contract, the Principal Representative, after a second seven (7) days' advance written Notice to the Contractor and the Surety may, without prejudice to any other remedy the Principal Representative may have, take control of all or a portion of the Work, as the Principal Representative deems necessary and make good such deficiencies deducting the cost thereof from the payment then or thereafter due the Contractor, as provided in Article 30, Correction Of Work Before Acceptance and Article 33, Payments Withheld, provided, however, that the Architect/Engineer shall approve the amount charged to the Contractor by approval of the Change Order.

B. TEMPORARY SUSPENSION OF WORK

The State, acting for itself or by and through the Architect/Engineer, shall have the authority to suspend the Work, either wholly or in part, for such period or periods as may be deemed necessary due to:

1. Unsuitable weather;
2. Faulty Workmanship;
3. Improper superintendence or project management;
4. Contractor's failure to carry out orders or to perform any provision of the Contract Documents;

5: Loss of, or restrictions to, appropriations;
6. Conditions, which may be considered unfavorable for the prosecution of the Work.

If it should become necessary to stop Work for an indefinite period, the Contractor shall store materials in such manner that they will not become an obstruction or become damaged in any way; and he or she shall take every precaution to prevent damage to or deterioration of the Work, provide suitable drainage and erect temporary structures where necessary.

Notice of suspension of Work shall be provided to the Contractor in writing stating the reasons therefore. The Contractor shall again proceed with the Work when so notified in writing.

The Contractor understands and agrees that the State of Colorado cannot predict with certainty future revenues and could ultimately lack the revenue to fund the appropriations applicable to this Contract. The Contractor further acknowledges and agrees that in such event that State may, upon Notice to the Contractor, suspend the Work in anticipation of a termination of the Contract for the convenience of the State, pursuant to Article 50, Termination For Convenience of State. If the Contract is not so terminated the Contract sum and the Contract time shall be equitably adjusted at the time the Principal Representative directs the Work to be recommenced and gives Notice that the revenue to fund the appropriation is available.

C. DELAY DAMAGES

The Principal Representative and the State of Colorado shall be liable to the Contractor for the payment of any claim for extra costs, extra compensation or damages occasioned by hindrances or delays encountered in the Work only when and to the limited extent that such hindrance or delay is caused by an act or omission within the control of the Principal Representative, the Architect/Engineer or other persons or entities acting on behalf of the Principal Representative. Further, the Principal Representative and the State of Colorado shall be liable to the Contractor for the payment of such a claim only if the Contractor has provided required Notice of the delay or impact, or has presented its claim for an extension of time or claim of other delay or other impact due to changes ordered in the Work before proceeding with the changed Work. Except as otherwise provided, claims for extension of time shall be Noticed and filed in accordance with Article 38, Delays and Extensions of Time, within three (3) business days of the beginning of the delay with any claim filed within seven (7) days after the delay has ceased, or such claim is waived. Claims for extension of time or for other delay or other impact resulting from changes ordered in the Work shall be presented and adjusted as provided in Article 35, Changes in the Work.

ARTICLE 49. STATE'S RIGHTS TO TERMINATE CONTRACT

A. GENERAL

If the Contractor should be adjudged bankrupt, or if he or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed to take over his affairs, or if he or she should fail to prosecute his or her Work with due diligence and carry the Work forward in accordance with the construction schedule and the time limits set forth in the Contract Documents, or if he or she should fail to subsequently perform one or more of the provisions of the Contract Documents to be performed by him, the Principal Representative may serve written Notice on the Contractor and the Surety on performance and payment bonds, stating his or her intention to exercise one of the remedies hereinafter set forth and the grounds upon which the Principal Representative bases his or her right to exercise such remedy.

In such event, unless the matter complained of is satisfactorily cleared within ten (10) days after delivery of such Notice, the Principal Representative may, without prejudice to any other right or remedy, exercise one of such remedies at once, having first obtained the concurrence of the Architect/Engineer in writing that sufficient cause exists to justify such action.

B. CONDITIONS AND PROCEDURES

1. The Principal Representative may terminate the services of the Contractor, which termination shall take effect immediately upon service of Notice thereof on the Contractor and his or her

Surety, whereupon the Surety shall have the right to take over and perform the Contract. If the Surety does not provide Notice to the Principal Representative of its intent to commence performance of the Contract within ten (10) days after delivery of the Notice of termination, the Principal Representative may take over the Work, take possession of and use all materials, tools, equipment and appliances on the premises and prosecute the Work to completion by such means as he or she shall deem best. In the event of such termination of his or her service, the Contractor shall not be entitled to any further payment under the Contract until the Work is completed and accepted. If the Principal Representative takes over the Work and if the unpaid balance of the contract price exceeds the cost of completing the Work, including compensation for any damages or expenses incurred by the Principal Representative through the default of the Contractor, such excess shall be paid to the Contractor. If, however, the cost, expenses and damages as certified by the Architect/Engineer exceed such unpaid balance of the contract price, the Contractor and his or her Surety shall pay the difference to the Principal Representative.

2. The Principal Representative may require the Surety on the Contractor 's bond to take control of the Work and see to it that all the deficiencies of the Contractor are made good, with due diligence within ten (10) days of delivery of Notice to the Surety to do so. As between the Principal Representative and the Surety, the cost of making good such deficiencies shall all be borne by the Surety. If the Surety takes over the Work, either by election upon termination of the services of the Contractor pursuant to Section B(1) of this Article 49, State's Right To Terminate Contract, or upon instructions from the Principal Representative to do so, the provisions of the Contract Documents shall govern the Work to be done by the Surety, the Surety being substituted for the Contractor as to such provisions, including provisions as to payment for the Work, the times of completion and provisions of this Article as to the right of the Principal Representative to do the Work or to take control of all or a portion of the Work.

3. The Principal Representative may take control of all or a portion of the Work and make good the deficiencies of the Contractor, or the Surety if the Surety has been substituted for the Contractor, with or without terminating the Contract, employing such additional help as the Principal Representative deems advisable in accordance with the provisions of Article 48A, State's Right To Do The Work; Temporary Suspension Of Work; Delay Damages. In such event, the Principal Representative shall be entitled to collect from the Contractor and his or her Surety, or to deduct from any payment then or thereafter due the Contractor, the costs incurred in having such deficiencies made good and any damages or expenses incurred through the default of Contractor, provided the Architect/Engineer approves the amount thus charged to the Contractor. If the Contract is not terminated, a Change Order to the Contract shall be executed, unilaterally if necessary, in accordance with the procedures of Article 35, Changes In The Work.

C. ADDITIONAL CONDITIONS

If any termination by the Principal Representative for cause is later determined to have been improper, the termination shall be automatically converted to and deemed to be a termination by the Principal Representative for convenience and the Contractor shall be limited in recovery to the compensation provided for in Article 50, Termination For Convenience Of State. Termination by the Contractor shall not be subject to such conversion.

ARTICLE 50. TERMINATION FOR CONVENIENCE OF STATE

A. NOTICE OF TERMINATION

The performance of Work under this Contract may be terminated, in whole or from time to time in part, by the State whenever for any reason the Principal Representative shall determine that such termination is in the best interest of State. Termination of Work hereunder shall be effected by delivery to the Contractor of a Notice of such termination specifying the extent to which the performance of Work under the Contract is terminated and the date upon which such termination becomes effective.

B. PROCEDURES

After receipt of the Notice of termination, the Contractor shall, to the extent appropriate to the termination, cancel outstanding commitments hereunder covering the procurement of materials, supplies, equipment and miscellaneous items. In addition, the Contractor shall exercise all reasonable diligence to accomplish the cancellation or diversion of all applicable outstanding commitments covering

personal performance of any Work terminated by the Notice. With respect to such canceled commitments, the Contractor agrees to:

1. settle all outstanding liabilities and all claims arising out of such cancellation of commitments, with approval or ratification of the Principal Representative, to the extent he or she may require, which approval or ratification shall be final for all purposes of this clause; and,
2. assign to the State, in the manner, at the time, and to the extent directed by the Principal Representative, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the State shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts.

The Contractor shall submit his or her termination claim to the Principal Representative promptly after receipt of a Notice of termination, but in no event later than three (3) months from the effective date thereof, unless one or more extensions in writing are granted by the Principal Representative upon written request of the Contractor within such three month period or authorized extension thereof. Upon failure of the Contractor to submit his or her termination claim within the time allowed, the Principal Representative may determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

Costs claimed, agreed to, or determined pursuant to the preceding and following paragraph shall be in accordance with the provisions of § 24-107-101, C.R.S., as amended and associated Cost Principles of the Colorado Procurement Rules as in effect on the date of this Contract.

Subject to the preceding provisions, the Contractor and the Principal Representative may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the termination under this clause, which amount or amounts may include any reasonable cancellation charges thereby incurred by the Contractor and any reasonable loss upon outstanding commitments for personal services which he or she is unable to cancel; provided, however, that in connection with any outstanding commitments for personal services which the Contractor is unable to cancel, the Contractor shall have exercised reasonable diligence to divert such commitments to other activities and operations. Any such agreement shall be embodied in an Amendment to this Contract and the Contractor shall be paid the agreed amount.

The State may from time to time, under such terms and conditions as it may prescribe, make partial payments against costs incurred by the Contractor in connection with the termination portion of this Contract, whenever, in the opinion of the Principal Representative, the aggregate of such payments is within the amount to which the Contractor will be entitled hereunder.

The Contractor agrees to transfer title and deliver to the State, in the manner, at the time, and to the extent, if any, directed by the Principal Representative, such information and items which, if the Contract had been completed, would have been required to be furnished to the State, including:

a. completed or partially completed plans, Drawings and information; and,
b. materials or equipment produced or in process or acquired in connection with the performance of the Work terminated by the Notice.

Other than the above, any termination inventory resulting from the termination of the Contract may, with written approval of the Principal Representative, be sold or acquired by the Contractor under the conditions prescribed by and at a price or prices approved by the Principal Representative. The proceeds of any such disposition shall be applied in reduction of any payments to be made by the State to the Contractor under this Contract or shall otherwise be credited to the price or cost of Work covered by this Contract or paid in such other manners as the Principal Representative may direct. Pending final disposition of property arising from the termination, the Contractor agrees to take such action as may be necessary, or as the Principal Representative may direct, for the protection and preservation of

the property related to this Contract which is in the possession of the Contractor and in which the State has or may acquire an interest.

Any disputes as to questions of fact, which may arise hereunder, shall be subject to the Remedies provisions of the Colorado Procurement Code, §§ 24-109-101, et seq., C.R.S., as amended.

ARTICLE 51. CONTRACTOR'S RIGHT TO STOP WORK AND/OR TERMINATE CONTRACT

If the Work shall be stopped under an order of any court or other public authority for a period of three (3) months through no act or fault of the Contractor or of any one employed by him, then the Contractor may on seven (7) days' written Notice to the Principal Representative and the Architect/Engineer stop Work or terminate this Contract and recover from the Principal Representative payment for all Work executed, any losses sustained on any plant or material, and a reasonable profit only for the Work completed. If the Architect/Engineer shall fail to issue or otherwise act in writing upon any certificate for payment within ten (10) days after it is presented and received by the Architect/Engineer, as provided in Article 31, Applications For Payments, or if the Principal Representative shall fail to pay the Contractor any sum certified that is not disputed in whole or in part by the Principal Representative in writing to the Contractor and the Architect/Engineer within thirty (30) days after the Architect/Engineer's certification, then the Contractor may on ten (10) days' written Notice to the Principal Representative and the Architect/Engineer stop Work and/or give written Notice of intention to terminate this Contract.

If the Principal Representative shall thereafter fail to pay the Contractor any amount certified by the Architect/Engineer and not disputed in writing by the Principal Representative within ten (10) days after receipt of such Notice, then the Contractor may terminate this Contract and recover from the Principal Representative payment for all Work executed, any losses sustained upon any plant or materials, and a reasonable profit only for the Work completed. The Principal Representative's right to dispute an amount certified by the Architect/Engineer shall not relieve the Principal Representative of the obligation to pay amounts not in dispute as certified by the Architect/Engineer.

ARTICLE 52. SPECIAL PROVISIONS

A. CONTROLLER'S APPROVAL CRS 24-30-202(1)
This Contract shall not be deemed valid until it has been approved by the Colorado State Controller or designee.

B. FUND AVAILABILITY CRS 24-30-202(5.5)
Financial obligations of the State payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available

C. GOVERNMENTAL IMMUNITY
No term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions, of the Colorado Governmental Immunity Act, CRS §24-10-101 et seq., or the Federal Tort Claims Act, 28 U.S.C. §§1346(b) and 2671 et seq., as applicable now or hereafter amended.

D. INDEPENDENT CONTRACTOR 4 CCR 801-2
Contractor shall perform its duties hereunder as an independent contractor and not as an employee. Neither Contractor nor any agent or employee of Contractor shall be deemed to be an agent or employee of the State. Contractor and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the State and the State shall not pay for or otherwise provide such coverage for Contractor or any of its agents or employees. Unemployment insurance benefits will be available to Contractor and its employees and agents only if such coverage is made available by Contractor or a third party. Contractor shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this contract. Contractor shall not have authorization, express or implied, to bind the State to any agreement, liability or understanding, except as expressly set forth herein. Contractor shall (a) provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, (b) provide proof thereof when requested by the State, and (c) be solely responsible for its acts and those of its employees and agents.

E. COMPLIANCE WITH LAW

Contractor shall strictly comply with all applicable federal and State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

F. CHOICE OF LAW

Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this contract. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this or any other Special Provision in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this contract, to the extent capable of execution.

G. BINDING ARBITRATION PROHIBITED

The State of Colorado does not agree to binding arbitration by any extra-judicial body or person. Any provision to the contrary in this contract or incorporated herein by reference shall be null and void.

H. SOFTWARE PIRACY PROHIBITION. Governor's Executive Order D 002 00

State or other public funds payable under this contract shall not be used for the acquisition, operation, or maintenance of computer software in violation of federal copyright laws or applicable licensing restrictions. Contractor hereby certifies and warrants that, during the term of this contract and any extensions, Contractor has and shall maintain in place appropriate systems and controls to prevent such improper use of public funds. If the State determines that Contractor is in violation of this provision, the State may exercise any remedy available at law or in equity or under this contract, including, without limitation, immediate termination of this contract and any remedy consistent with federal copyright laws or applicable licensing restrictions.

I. EMPLOYEE FINANCIAL INTEREST/CONFLICT OF INTEREST CRS 24-18-201 & CRS 24-50-507

The signatories aver that to their knowledge, no employee of the State has any personal or beneficial interest whatsoever in the service or property described in this contract. Contractor has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of Contractor's services and Contractor shall not employ any person having such known interests.

J. VENDOR OFFSET CRS 24-30-202(1) & CRS 24-30-202.4

Subject to CRS §24-30-202.4 (3.5), the State Controller may withhold payment under the State's vendor offset intercept system for debts owed to State agencies for: **(a)** unpaid child support debts or child support arrearages; **(b)** unpaid balances of tax, accrued interest, or other charges specified in CRS §39-21-101, et seq.; **(c)** unpaid loans due to the Student Loan Division of the Department of Higher Education; **(d)** amounts required to be paid to the Unemployment Compensation Fund; and **(e)** other unpaid debts owing to the State as a result of final agency determination or judicial action.

K. PUBLIC CONTRACTS FOR SERVICES. CRS §8-17.5-101.

[**Not Applicable to agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental agreements, or information technology services or products and services**] Contractor certifies, warrants, and agrees that it does not knowingly employ or contract with an illegal alien who will perform Work under this contract and will confirm the employment eligibility of all employees who are newly hired for employment in the United States to perform Work under this contract, through participation in the E-Verify Program or the Department program established pursuant to CRS §8-17.5-102(5)(c), Contractor shall not knowingly employ or contract with an illegal alien to perform Work under this contract or enter into a contract with a subcontractor that fails to certify to Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform Work under this contract. Contractor **(a)** shall not use E-Verify Program or Department program procedures to undertake pre-employment screening of job applicants while this contract is being performed, **(b)** shall notify the subcontractor and

the contracting State agency within three days if Contractor has actual knowledge that a subcontractor is employing or contracting with an illegal alien for Work under this contract, **(c)** shall terminate the subcontract if a subcontractor does not stop employing or contracting with the illegal alien within three days of receiving the notice, and **(d)** shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to CRS §8-17.5-102(5), by the Colorado Department of Labor and Employment. If Contractor participates in the Department program, Contractor shall deliver to the contracting State agency, Institution of Higher Education or political subdivision a written, notarized affirmation, affirming that Contractor has examined the legal Work status of such employee, and shall comply with all of the other requirements of the Department program. If Contractor fails to comply with any requirement of this provision or CRS §8-17.5-101 et seq., the contracting State agency, institution of higher education or political subdivision may terminate this contract for breach and, if so terminated, Contractor shall be liable for damages.

L. PUBLIC CONTRACTS WITH NATURAL PERSONS. CRS §24-76.5-101.
Contractor, if a natural person eighteen (18) years of age or older, hereby swears and affirms under penalty of perjury that he or she (a) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (b) shall comply with the provisions of CRS §24-76.5-101 et seq., and (c) has produced one form of identification required by CRS §24-76.5-103 prior to the effective date of this contract.

ARTICLE 53. MISCELLANEOUS PROVISIONS

A. CONSTRUCTION OF LANGUAGE
The language used in these General Conditions shall be construed as a whole according to its plain meaning, and not strictly for or against any party. Such construction shall, however, construe language to interpret the intent of the parties giving due consideration to the order of precedence noted in Article 2C, Intent of Documents.

B. SEVERABILITY
Provided this Agreement can be executed and performance of the obligations of the Parties accomplished within its intent, the provisions hereof are severable and any provision that is declared invalid or becomes inoperable for any reason shall not affect the validity of any other provision hereof, provided that the Parties can continue to perform their obligations under this Agreement in accordance with its intent.

C. SECTION HEADINGS
The captions and headings in this Agreement are for convenience of reference only, and shall not be used to interpret, define, or limit its provisions.

D. AUTHORITY
Each person executing the Agreement and its Exhibits in a representative capacity expressly represents and warrants that he or she has been duly authorized by one of the parties to execute the Agreement and has authority to bind said party to the terms and conditions hereof.

E. INTEGRATION OF UNDERSTANDING
This Contract is intended as the complete integration of all understandings between the parties and supersedes all prior negotiations, representations, or agreements, whether written or oral. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or affect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion, or other amendment hereto shall have any force or effect unless embodied in a written Change Order or Amendment to this Contract.

F. VENUE
All suits or actions related to this Agreement shall be filed and proceedings held in the State of Colorado and exclusive venue shall be in the City and County of Denver.

G. NO THIRD PARTY BENEFICIARIES

Enforcement of this Agreement and all rights and obligations hereunder are reserved solely to the Parties. Any services or benefits which third parties receive as a result of this Contract are incidental to the Contract, and do not create any rights for such third parties.

H. WAIVER

Waiver of any breach under a term, provision, or requirement of this Agreement, or any right or remedy hereunder, whether explicitly or by lack of enforcement, shall not be construed or deemed as a waiver of any subsequent breach of such term, provision or requirement, or of any other term, provision, or requirement.

I. INDEMNIFICATION

Contractor shall indemnify, save, and hold harmless the State, its employees and agents, against any and all claims, damages, liability and court awards including costs, expenses, and attorney fees , to the extent such claims are caused by any negligent act or omission of the Contractor, its employees, agents, subcontractors or assignees pursuant to the terms of this Contract, but not to the extent such claims are caused by any negligent act or omission of, or breach of contract by, the State, its employees, agents, other contractors or assignees, or other parties not under control of or responsible to the Contractor.

J. STATEWIDE CONTRACT MANAGEMENT SYSTEM

If the maximum amount payable to Contractor under this Contract is $100,000 or greater, either on the Effective Date or at anytime thereafter, this section shall apply.

Contractor agrees to be governed, and to abide, by the provisions of CRS 24-102-205, 24-102-206, 24-103-601, 24-103.5-101, 24-105-101, and 24-105-102 concerning the monitoring of vendor performance on state contracts and inclusion of contract performance information in a statewide contract management system.

Contractor's performance shall be subject to Evaluation and Review in accordance with the terms and conditions of this Contract, State law, including C.R.S 24-103.5-101, and State Fiscal Rules, Policies and Guidance. Evaluation and Review of Contractor's performance shall be part of the normal contract administration process and Contractor's performance will be systematically recorded in the statewide Contract Management System. Areas of Evaluation and Review shall include, but shall not be limited to quality, cost and timeliness. Collection of information relevant to the performance of Contractor's obligations under this Contract shall be determined by the specific requirements of such obligations and shall include factors tailored to match the requirements of Contractor's obligations. Such performance information shall be entered into the statewide Contract Management System at intervals established herein and a final Evaluation, Review and Rating shall be rendered within 30 days of the end of the Contract term. Contractor shall be notified following each performance Evaluation and Review, and shall address or correct any identified problem in a timely manner and maintain Work progress.

Should the final performance Evaluation and Review determine that Contractor demonstrated a gross failure to meet the performance measures established hereunder, the Executive Director of the Colorado Department of Personnel and Administration (Executive Director), upon request by the Principal Representative, and showing of good cause, may debar Contractor and prohibit Contractor from bidding on future contracts. Contractor may contest the final Evaluation, Review and Rating by: (a) filing rebuttal statements, which may result in either removal or correction of the evaluation (CRS 24-105-102(6)), or (b) under CRS 24-105-102(6), exercising the debarment protest and appeal rights provided in CRS 24-109-106, 107, 201 or 202, which may result in the reversal of the debarment and reinstatement of Contractor, by the Executive Director, upon a showing of good cause.

K. CORA DISCLOSURE

To the extent not prohibited by federal law, this Agreement and the performance measures and standards under CRS §24-103.5-101, if any, are subject to public release through the Colorado Open Records Act, CRS §24-72-101, et seq.

UNIVERSITY OF COLORADO DENVER
SUPPLEMENTARY GENERAL CONDITIONS
For Design Bid Build Contractor Agreement and General Conditions of the Contract (SC6.21 and SC6.23)

APPENDIX A

Tax Information:

1. Tax Exempt Status of University of Colorado, dated November 4, 2009
2. City of Aurora Sales and Use Tax Exemption, dated March 12, 2001
3. City of County of Denver Tax Confirming Exemption Status, dated November 5, 1999
4. State of Colorado Letter Confirming Adams County, RTD, Stadium, and Cultural Tax Exemptions, dated April 7, 2006
5. Colorado Department of Revenue - Contractor Application for Exemption Certification

DR 0160 (02/08/07)
COLORADO DEPARTMENT OF REVENUE
DENVER CO 80261-0013

CERTIFICATE OF EXEMPTION FOR COLORADO STATE SALES/USE TAX ONLY

THIS LICENSE IS NOT TRANSFERABLE

USE ACCOUNT NUMBER for all references	LIABILITY INFORMATION	ISSUE DATE
98-00799-0000	01 006 N 080179	NOV 04 2009

1380 LAWRENCE ST DENVER CO

UNIVERSITY OF COLORADO DENVER
CAMPUS BOX 129 PO BOX 173364
DENVER CO 80217

Executive Director
Department of Revenue

NEW AUTOMATED SERVICES FOR AND ABOUT BUSINESSES

The Colorado Department of Revenue Sales Tax Information System provides the following automated services:

* Colorado Sales Tax Rates - find specific city, county and special district rates.
* Verification of Sales Tax License Exemption Numbers - determine whether a Colorado sales tax license or exemption certificate is valid.
* Tax Rates by Account Number - find sales tax rates and locations for specific sales tax accounts.

These services make it possible for taxpayers to help themselves to information 24 hours a day - without requiring the assistance of a customer service representative. In this way, more complicated or confidential tax information inquiries can be reserved for speaking to a live agent.

Listen and look for these services on the department's business tax information phone line at 303-238-FAST (3278) for specific account information, 303-238-SERV (7378) for general information or the DOR Web site at www.taxcolorado.com

Web users can try the new system online at www.taxview.state.co.us We are interested in your comments about the system. You can send us an e-mail with your comments through our Department of Revenue Web site.

DR 0563 (01/05/04)
COLORADO DEPARTMENT OF REVENUE
1375 SHERMAN STREET
DENVER COLORADO 80261

See reverse side for instructions.

SALES TAX EXEMPTION CERTIFICATE
MULTI - JURISDICTION

Issued to (Seller): | Address:

I CERTIFY THAT

Name of Firm (Buyer): Regents of University of Colorado

Street Address or Post Office Box Number: 1800 Grant Street, Suite 600

City: Denver | State: CO | ZIP Code: 80203

QUALIFIES AS (Check each applicable item)

☐ WHOLESALER ☐ RETAILER ☐ MANUFACTURER ☐ LESSOR* (See note on reverse side) ☐ CHARITABLE OR RELIGIOUS

☒ POLITICAL SUBDIVISION OR GOVERNMENTAL AGENCY ☐ OTHER (Specify) _____

1) and is registered with the below listed states and cities within which your firm would deliver purchases to us which are for resale or lease by us in the normal course of our business which is _____ or

2) that such purchases are exempt from payment of sales or use tax in such states and cities because our buyer is: ☐ CHARITABLE OR RELIGIOUS ☒ POLITICAL SUBDIVISION OR GOVERNMENTAL AGENCY ☐ OTHERWISE EXEMPT BY STATUTE (SPECIFY) _____

City or State	State Registration or ID Number	City or State	State Registration or ID Number
City of Aurora	98-00799-0000		
Colorado	98-02915		

If the list of states and cities is more than six (6), attach a list to this certificate.

I further certify that if any property so purchased tax free is used or consumed by the firm as to make it subject to a Sales or Use Tax we will pay the tax due direct to the proper taxing authority when state law so provides or inform the seller for added tax billing. This certificate shall be part of each order which we may hereafter give to you, unless otherwise specified, and shall be valid until cancelled by us in writing or revoked by the city or state.

General description of products to be purchased from the seller

Under penalties of perjury, I swear or affirm that the information on this form is true and correct as to every material matter.

Authorized Signature (Owner, Partner or Corporate Officer)	Title	Date
	Associate Vice President and University Controller	7/25/2008

FINANCE DEPARTMENT

Administration
1470 South Havana Street
Aurora, Colorado 80012
303-739-7055
FAX: 303-739-7068

March 12, 2001

Wayne F. Henderson
Vice Chancellor for Administration and Finance
University of Colorado Health Sciences Center
Fitzsimons, Building 500, Room C1003
P.O. Box 6508
Aurora, Colorado 80045-0508

RE: Letter of Commitment

Dear Mr. Henderson:

I am in receipt of your letter dated February 27, 2001, requesting that I issue a letter of commitment to the University of Colorado Health Sciences Center ("UCHSC") pursuant to *City Code Section 130-63(c)*. It is my understanding that UCHSC is part and parcel of the University of Colorado, a public institution of higher education of the State of Colorado. *§ 23-20-101, et seq., C.R.S.* You have asked for some assurance that UCHSC is exempt from the payment of City sales and use tax, as well as the employer portion of the City occupational privilege tax.

City Code Section 130-157(1) exempts all sales of tangible personal property and taxable services to the various political subdivisions of this state from imposition of City sales tax. Identical exemptions exist in both the City Use Tax ordinance (*City Code § 130-198(5)*) and the City Employer Occupational Privilege Tax ordinance (*City Code § 130-405(1)*). Accordingly, UCHSC falls squarely within each of these three exemptions.

It should be noted, however, that these exemptions do not extend to the collection of City tax. For instance, UCHSC must collect, report, and remit City sales tax on any retail sale of tangible personal property or taxable services it makes to a non-exempt third party. *City Code § 130-160.* Likewise, UCHSC

must also collect, report, and remit the employee portion of the City occupational privilege tax for each person it employs within the City for any period of time within a calendar month sufficient to receive no less than $250.00 as compensation for such employment. *City Code § 130-464.*

With respect to the deposit and ultimate payment of City use tax on construction materials, it is the longstanding policy of the City that the party who contracts for and directs and controls the construction of building improvements is liable for such tax. *See Fifteenth Street Investment Co. v. People, 102 Colo. 571, 81 P.2d 764 (1938).* Under the circumstances described in your request, it is UCHSC, and not its contractors, upon whom sole liability for the payment of City use tax would rest. Because UCHSC is an exempt entity, no use tax is due and owing on the purchase and subsequent use of construction materials for the development of UCHSC's property at the Fitzsimons site.

With regard to your additional requests, the City has no objection if UCHSC's contractors wish to use this letter to present to City building officials and third-party retailers as evidence of UCHSC's tax exemption. As for any future revocation of this letter, unless the status of UCHSC as a political subdivision changes, the various City tax exemptions which UCHSC is entitled to claim cannot be lawfully repealed without the prior approval of the City's voters. *See Colo. Const. Art. X, § 20(4)(a).* Therefore, the City believes UCHSC will be adequately informed in the event that the City decides to seek approval for any change in its tax laws that would impact UCHSC's tax-exempt status.

Very truly yours,

John Gross
Director of Finance

CITY AND COUNTY OF DENVER

WELLINGTON E. WEBB
Mayor

DEPARTMENT OF REVENUE

TREASURY DIVISION
ANNEX III
144 WEST COLFAX AVE.
DENVER, COLORADO 80202
FAX: (303) 640-3868

November 5, 1999

University of Colorado Procurement Service Center
Fitzsimons Building 500 Rm. B4325
Mail Stop F 719
P.O. Box 6508
Aurora, CO 80045

Ladies/Gentlemen:

The University of Colorado Procurement Service Center is exempt from the Denver sales tax per Sec. 53-26 (1) of the City Retail Sales Tax Article:

> Sec. 53-26(1) Exemptions.
>
> There shall be exempt from taxation under the provisions of this Article the following: (1) All sales to the United States Government, to the State, its departments and institutions and the political subdivisions thereof, only when purchased in their governmental capacities.

To qualify for the exemption, purchases must be billed direct to the organization, and payment made from funds of the organization.

The exemption does not extend to construction contractors who may perform contracts for you; they are the consumer of all property purchased and used in the performance or contracts for others. Nor does the exemption apply to purchases by employees or members for their own personal use.

You may reproduce this letter to furnish to suppliers as needed.

Sincerely,

Scott Sprague, Audit Manager
Tax Compliance/Audit Section
(303) 640-3484

STATE OF COLORADO

TAXPAYER SERVICE DIVISION
Department of Revenue

1375 Sherman Street
Denver, Colorado 80261

Bill Owens
Governor

M. Michael Cooke
Executive Director

Neil Tillquist
Division Director

Michael J. Barden
University of Colorado at Denver and Health Sciences Center(UCDHSC)
Building 500, Mail Stop F418
P.O. Box 6508
Aurora CO 80045

April 7, 2006

Dear Mr. Barden:

This is in response to your letter of March 1, 2006, to Bruce Nelson of the Department of Revenue regarding sales tax exemption from county and special district sales taxes for UCDHSC construction projects at the Fitzsimons campus. Mr. Nelson has left the Department, so I am responding to your inquiry.

In regards to Adams County sales and use tax, the sales tax is collected by the Department of Revenue, not the city of Aurora. Use tax on building materials is collected by the county when issuing building permits. Under 29-2-105(d), 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., UCDHSC and its contractors and sub-contractors are exempt from county sales and use tax on construction and building materials for State/UCDHSC owned real property.

In regards to special district sales and use taxes, UCDHSC and its contractors and sub-contractors are exempt from sales and use tax pursuant to the exemptions granted in 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., for the Regional Transportation District under 32-9-119(2)(c)(II), C.R.S, for the Scientific and Cultural District under 32-13-107(2), C.R.S, and for the Metropolitan Football Stadium District under 32-15-110(2)(a), C.R.S.

Additionally, for construction projects in the City and County of Denver, UCDHSC and its contractors and sub-contractors are exempt from the aforementioned special district sales and use taxes, as well as state sales and use tax.

Should you have additional questions regarding these matters, feel free to contact me.

Respectfully,

Steve Asbell

Steve Asbell
Taxpayer Service Policy Group
Colorado Dept of Revenue
Ph:303.866.3889 email: sasbell@spike.dor.state.co.us

DR 0172 (09/21/06)
COLORADO DEPARTMENT OF REVENUE
TAXPAYER SERVICE DIVISION
DENVER CO 80261
(303) 238-SERV (7378)

Departmental Use Only

CONTRACTOR APPLICATION FOR EXEMPTION CERTIFICATE

Pursuant to Statute
Section 39-26.708(1)(a)(XIX)

The exemption certificate for which you are applying must be used only for the purpose of purchasing construction and building materials for the exempt project described below. This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works **owned** and **used** by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law.

A separate certificate is required for each contract.

Subcontractors will **not** be issued Certificates of Exemption by the Department of Revenue. It is the responsibility of the prime contractor to issue certificates to each of the subcontractors. *(See reverse side.)*

SEND COMPLETED FORMS TO: COLORADO DEPARTMENT OF REVENUE, DENVER, CO 80261

FAILURE TO ACCURATELY COMPLETE ALL BOXES WILL CAUSE THE APPLICATION TO BE DENIED.

Contractor/Account No. (Leave blank if filing for the first time)	Period	
89 -		**0170-750 (999) $0.00**

CONTRACTOR INFORMATION

Trade name/DBA:	Owner, partner, or corporate name:	
Mailing address (City, State, Zip):	Contact Person	
E-Mail address:	Federal Employer's Identification Number:	Bid amount for your contract: $
Fax number: ( )	Business telephone number: ( )	Colorado withholding tax account number:

EXEMPTION INFORMATION

Copies of contract or agreement pages, identifying the contracting parties, bid amount, type of work, and signatures of contracting parties MUST be attached.

Name of exempt organization (as shown on contract):	Exempt organization's number: **98 -**
Address of exempt organization (City, State, Zip):	
Principal contact at exempt organization:	Principal contact's telephone number:
Physical location of project site (give actual address when applicable and Cities and/or County (ies) where project is located)	
Scheduled construction start date: Month Day Year	Estimated completion date: Month Day Year

I declare under penalty of perjury in the second degree that the statements made in this application are true and complete to the best of my knowledge.

Signature of the business owner, partner or corporate officer:	Title of corporate officer:	Date:

DO NOT WRITE BELOW THIS LINE

Special Notice

Contractors who have completed this application in the past, please note the following changes in procedure:

The Department will no longer issue individual Certificates of exemption to subcontractors. Only prime contractors will receive a Contractor's Exemption Certificate on exempt projects.

Upon receipt of the Certificate, the prime contractor should make a copy for each subcontractor involved in the project and complete it by filling in the subcontractor's name and address and signing it.

The original Certificate should always be retained by the prime contractor. Copies of all Certificates that the prime contractor issued to subcontractors should be kept at the prime contractor's place of business for a minimum of three years and be available for inspection in the event of an audit.

Once an 89# has been assigned to you, please use the next five numbers following it for any applications submitted for future projects. This should be your permanent number. For instance, if you were assigned 89-12345-0001, every application submitted thereafter should contain 89-12345 on the application. The succeeding numbers will be issued by the Department of Revenue. **DO NOT** enter what you believe to be the next in sequence as this may delay processing of your application.

SECTION 01 00 00 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Design Requirements:
1. Designer Responsibility: Based on a series of meetings with the University Project Manager and applicable University staff, draft Division 01 Specification Sections consistent with State of Colorado Construction Contract provisions, General and Supplementary Conditions of the Contract, including requirements for administrative procedures consistent with the size and scope of the project.
2. Content: Include, as applicable, the following Sections:
   a. SECTION 01 00 00 – SUMMARY.
   b. SECTION 01 25 00 – SUBSTITUTION PROCEDURES.
   c. SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES.
   d. SECTION 01 31 00 – PROJECT MANAGEMENTS AND COORDINATION.
   e. SECTION 01 32 33 – PHOTOGRAPHIC DOCUMENTATION.
   f. SECTION 01 33 00 – SUBMITTAL PROCEDURES.
   g. SECTION 01 35 00 – SPECIAL PROCEDURES.
      1) This Section includes special environment health and safety procedures unique to work at University projects.
   h. SECTION 01 35 46 – INDOOR AIR QUALITY PROCEDURES
      1) This Section includes special procedures required by the University to maintain a high level of indoor air quality both during construction and subsequent to occupancy.
   i. SECTION 01 40 00 – QUALITY REQUIREMENTS.
   j. SECTION 01 41 00 – REGULATORY REQUIREMENTS.
   k. SECTION 01 42 00 – REFERENCES.
   l. SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS.
   m. SECTION 01 60 00 – PRODUCT REQUIREMENTS.
   n. SECTION 01 73 00 – CLOSEOUT PROCEDURES.
   o. SECTION 01 78 23 – OPERATION AND MAINTENANCE DATA.
   p. SECTION 01 78 39 – PROJECT RECORD DOCUMENTS.
   q. SECTION 01 78 46 – EXTRA STOCK MATERIALS.
   r. SECTION 01 79 00 – DEMONSTRATION AND TRAINING.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 00 00

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by University.
4. Work under separate contracts.
5. University-furnished and installed products.
6. University-furnished, Contractor-installed products.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.

B. Related Requirements:

1. Section 01 35 46 “Indoor Air Quality Procedures” for requirements and procedures related to maintaining air quality in adjacent occupied spaces and buildings.
2. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of University's facilities and for the provision of temporary construction barriers and dust partitions.

1.3 PROJECT INFORMATION

A. Project Identification: Perinatal Replace Chiller 2 / PN 20-115536

1. Project Location: Perinatal Research Facility, 13243 East 23rd Avenue, Aurora, CO 80045

B. Principal Representation: University of Colorado Denver.

1. University's Representative: Daniel Miro / 720-425-1444 / daniel.miro@cuanschutz.edu

C. Architect/Engineer: MEP Engineering, Inc. / Aaron Shelburne / 720-541-6321 / aaron.shelburne@mep-eng.com

D. Architect/Engineer's Consultants: The Architect/Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents:

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and, in summary, briefly consists of the following:

1. Replace Chiller 2 at the Perinatal Research Facility

1.5 WORK BY UNIVERSITY

A. General: Cooperate fully with University so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by University. Coordinate the Work of this Contract with work performed by University.

1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 UNIVERSITY-FURNISHED AND INSTALLED PRODUCTS

A. University will furnish certain items of equipment/furnishings as shown on the Drawings. Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.

B. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.

1.8 UNIVERSITY-FURNISHED, CONTRACTOR-INSTALLED PRODUCTS

A. The University will furnish certain items delivered to the jobsite as shown on the drawings. Contractor will receive, unload, move, set in position, anchor and connect such items and put them into operating condition.

B. The Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.

C. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.

D. Cooperate with University in scheduling the delivery of these items and be responsible for accommodating their storage and protection in the building and their replacement or repair due to damage as a result of Contractor's operations.

1.9 ACCESS TO SITE

A. General: Contractor shall have limited and restricted use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Adjust means and methods of construction based on site limits and restrictions.
2. Locate staging areas only where permitted by University.
3. As part of this Project, replace damaged lawns, sprinkler systems, sidewalks and any other existing site improvements within staging area and access ways.

C. Construction Access and Travel:

1. Use only those entrances, exits, and travel ways on campus roads and within the building designated by University. Contractor's personnel are not permitted in non-designated areas of University's existing facilities. Use only designated travel ways for transporting demolition materials, new construction materials, tools and equipment.
2. Use of other than designated travel ways on campus roads and within existing buildings requires a minimum of 20 business days prior approval by University.

   a. Request variations to traffic flow including temporary fire lane, parking lot, sidewalk and road closures, regulatory signage, and traffic control devices in accordance with University "Procedure for Approval of Regulatory Signage, Traffic Control Devices and for Street Closures at the Anschutz Medical Campus" and "AMC Campus Street and Parking Lot Closure Request" available through University Project Manager.

3. Access to the site will be as permitted by the University. Prearrange delivery and use of cranes, heavy trucks and other heavy equipment at least 72 hours prior to need through the University's Project Manager and University Police.
4. Maintain access to fire lanes and campus operations at all times. Provide flag personnel during the ingress or egress of large equipment.

   a. When fire lanes and/or access way must be temporarily disrupted notify University Police and University Parking and Transportation at least 20 business days in advance and reconfirm 72 hours in advance through the University's Project Manager.

5. Arrange for and obtain all necessary permits from City of Aurora for any disruption to or temporary closures of public city streets. Coordinate procurement of permits with Anschutz Medical Campus Liaison and University Project Manager.

D. Construction Parking:

1. General: Contractor must pay for all parking and, if available, may be assigned parking spaces in designated contractor parking lots. Parking in lots designated for visitors and patients is not permitted. Make arrangements for designated spaces and payment for long term parking with University Parking Services through the University Project Manager.
2. Provide temporary parking or use designated areas of University's existing parking areas as applicable to the Project and in accordance with the following:

   a. All parking on University property, including parking on University owned streets, is under the exclusive control and authority of University Parking and Transportation Services. Direct policy question to the department at (303) 724-2555.
   b. There is no free parking on campus. Displacement or use of existing parking spaces by Contractor, either for parking or for staging, is a Contractor cost.
   c. Use of existing parking spaces or other areas outside of Contractor's staging area must be approved in advance by University Parking and Transportation Services.
   d. University Parking and Transportation Services may require and issue parking permits through the University Project Manager. Permits must be displayed and visible at all times

while parked on the campus. Failure to display a permit will result in citations being written and possible removal of the vehicle from University property.

e. Keep all designated parking areas clean and free of litter and debris. University reserves the right to direct Contractor to clean areas not kept clean and orderly.

f. University Parking and Transportation Services may change parking assignments as deemed necessary, restrict the use of any space(s) or lot(s) at any time, and determine the hours of control and mode of operations for any parking area at any time. University Parking and Transportation Services may deny or revoke parking privileges to any person when deemed necessary and/or considered to be in the best interests of the University.

3. Parking on University property is at the Contractor's own risk. The University and any entity affiliated with it are not responsible for fire, theft, and damage to or loss of contractor's or subcontractor's vehicle or any article left therein. Only a license is granted to the user and no bailment is created.

E. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.10 COORDINATION WITH OCCUPANTS

A. University may occupy site and both existing and adjacent building(s) during entire construction period. Cooperate with University during construction and sequence operations to minimize conflicts and facilitate University usage. Perform the Work so as not to interfere with University's day-to-day operations.

1. Maintain existing exits from existing and adjacent building, unless otherwise indicated.
2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from University and approval of authorities having jurisdiction.
3. Limit construction operations to those methods and procedures which will not adversely and unduly affect the working environment of University's occupied spaces, including noise, dust, odors, air pollution, ambient discomfort, poor lighting, hazards and other undesirable effects and conditions.
4. Coordinate with University Project Manager to schedule jack hammering or activities producing dusty conditions, excessive fumes or odors during off-hours.
5. When work must be accomplished in areas containing existing furniture, upon a minimum of 3 business days notification of the University Project Manager, University will remove or relocate existing furniture.
6. Provide not less than 72 hours' notice to University Project Manager of activities that will affect University's operations. University Project Manager will coordinate with campus tenants.

   a. Refer to "Work Restrictions" Article of this Section for procedures and notification requirements related to utility interruptions.

7. Provide temporary barriers and partitions, or other means as required to protect occupants of existing building and the general public from injury due to construction activities. Prevent the spread of dust and dirt to adjacent occupied areas and building.

1.11 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
2. In planning and executing the Work, take into consideration the special needs of University patient care, teaching and research settings, for example, supply of critical utilities, noise and dust control, access to existing loading docks, occupied buildings, etc.

B. Normal Working Hours: Limit work to normal working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday.

1. Notify University Project Manager of all proposed work outside of normal working hours. Include dates, times, names and contact information for contractors and subcontractor performing the Work with notification. University Project Manager will notify, as appropriate, other University personnel and departments including, but not limited to, Building Maintenance and Operations (BMO) Directors, BMO assigned representative, Campus Police and Facilities Management.

C. Noise and Vibration: Coordinate operations that may result in high levels of noise and vibration, or other disruption to University occupancy with University.

1. Noise during Normal Working Hours: Identify potentially disruptive construction activities at weekly Progress Meeting and adjust active time of day to reduce significant impacts on occupants.
2. Noise outside Normal Working Hours: Schedule construction work or demolition work outside of normal working hours with University Project Manager at minimum of 72 hours in advance.

   a. The maximum permissible noise level is 75 decibels (dBA), measured at the adjacent property line.

D. Contractor Identification:

1. Supervisory staff for the primary contractor must obtain an identification badge at the University Anschutz Medical Center (AMC) Building 500. Submit the University Access Control Badge Application form through University Project Manager. Submitted forms shall be complete with all required information including a letter on company letterhead confirming employee status with company and stating whether the company completes background testing and/or drug screening. Contractor supervision must display badge on site during construction activities.
2. To the greatest extent possible, Contractor's and subcontractor's employees must wear a recognizable logo shirt or hardhat identifying them as members of the contractor's work force.

E. Use of Existing Elevators: Use "freight" elevators only and protect finishes during transport. Restrict use exclusively to time required to move construction materials.

1. Do not block corridors, aisles, passageways or doors leading to elevator except as, and only to the extent approved by University Project Manager.

F. Keys: Submit written request to University Project Manager on University Key Request Form.

1. To the extent the need for keys is demonstrated and required to complete the Work, University Project Manager will issue keys to Contractor.
2. Contractor is responsible for all costs related to lost or non-returned keys.
3. Electrical, mechanical and sensitive research space may require University escort in lieu of issuing keys.

G. Dock Deliveries: Restrict use exclusively to time required to unload and move construction materials.

H. Existing Utility Interruptions: Do not interrupt water, sewer, plumbing, gas, steam, chilled water, oxygen, HVAC, electrical power, lighting, telephone and other related utilities serving facilities occupied by University without prior notice to and approval by the University. Coordinate and schedule interruptions in advance through the University Project Manager in strict conformance with University Utility Interruption/Outage Request Procedure.

1. Form of Notice: University Utility Interruption and Start-up Request form.
2. Time of Notice: Notice for major and minor outages as defined by the Utility Interruption/Outage Request Procedure is 8 business days for minor outages and 31 business days for major outages.

I. Fire Alarm and Fire Sprinkler Interruptions: When construction activities require interruption of fire alarm or fire sprinkler service, or when dust from construction activities is likely to cause accidental alarm, advise University Project Manager who will submit an interruption request.

1. Form of Notice: University Fire Alarm/Sprinkler Disable Request Form.
2. Time of Notice: Prior to noon on the day before the anticipated interruption.

J. Nonsmoking Campus: Smoking, chewing tobacco, and other related tobacco product use is not permitted at any location on campus or on any adjacent property.

K. University Policies Applying to All Contractors: Comply with University policies applying to contractors including drug policy, sexual harassment policy and tobacco free policy. Obtain copies of University policies from University Project Manager.

1. Controlled Substances: Use of tobacco products and other controlled substances on Project site and surrounding Campus is not permitted.

L. Designated Eating Areas: Restrict consumption of food on project site to designated eating areas as approved by University Project Manager.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
3. Words in the singular number include the plural and those in the plural include the singular.
4. Words of any gender include any other gender.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

3. Keynoting: Materials and products may be identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 18 00

PROJECT UTILITY SOURCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes matrix of utility sources applicable to Project.

1.3 QUALITY ASSURANCE

A. Comply with utility company and regulatory agency codes, standards, and guidelines for the provision of new or extension of exiting utilities.

1.4 UTILITY SOURCE MATRIX

A. The following matrix summarizes utility responsible for provision of utility service:

	AMC				DC		AMC		DC	
	Trunk		**In Tract**		**Trunk**	**In Tract**	**Trunk**	**In Tract**	**Trunk**	**In Tract**
Steam	University	***Note 1***	Developer		Xcel	University	University	University	DW	University
Chilled Water	University	***Note 1***	Developer		NA	University	University	University	NA	University
Electricity	University	***Note 2***	Developer		Xcel	University	University	University	DW	University
Storm Drainage	COA		Developer		DW	University	University/ COA ***Note 5***	University	DW	University
Sanitary Sewer	COA		Developer		DW	University	University/ COA ***Note 5***	University	DW	University
Water	COA		Developer		DW	University	University/ COA ***Note 5***	University	DW	University
Telecommunications	University	***Note 3***	Developer	***Note 3***	University	University	University	University	DW	University
Natural Gas	Xcel	***Note 4***	Developer		Xcel	University	University	University	DW	University

University: University of Colorado Denver

COA: City of Aurora

DW: Denver Water

Developer:

University, TCH, UCH. In Tract lines are owned by the building they are feeding

Note 1: University owns Trunk steam and chilled water from CUP to vault

Note 2: University owns Trunk electrical from switch gear to manhole

Note 3: University owns Trunk telecom ductbank from main switch to manhole. Developer owns cable from switch to building

Note 4: Xcel has license agreement with University

Note 5: University and COA jointly permit

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 18 00

SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.

C. Related Requirements:

1. Section 01 22 00 "Unit Prices" for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect/Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect/Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect/Engineer from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 [**LUMP-SUM**] [**UNIT-COST**] [**AND**] [**QUANTITY**] ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by University or selected by Architect/Engineer under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by University and/or selected by Architect/Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to University, after installation has been completed and accepted.

1. If requested by Architect/Engineer, retain and prepare unused material for storage by University. Deliver unused material to University's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. University reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

1. This allowance includes [**material cost**] [**receiving, handling, and installation**] [**and**] [**Contractor overhead and profit**].
2. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 "Unit Prices."

END OF SECTION 01 21 00

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 01 21 00 “Allowances” for lump-sum and unit-cost allowances.
2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by Change Order, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Upon completion of work involving unit prices, submit documentation to establish actual quantity of work provided. A Change Order will be issued in an amount equal to the actual quantity multiplied by the unit price.

C. University reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at University's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

END OF SECTION 01 22 00

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if University decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
3. Selection of alternates described in this Section may be deferred for possible selection at a subsequent date if so indicated in the Agreement.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

1. Alternate descriptions are recognized as abbreviated and incomplete. Correlate the descriptions with applicable Specification Sections and Drawings for the provision of complete and coordinated work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 21 00 "Allowances" for products selected under an allowance, if applicable.
2. Section 01 23 00 "Alternates" for products selected under an alternate, if applicable.
3. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or University that are not required in order to meet other Project requirements but may offer advantage to Contractor or University.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit each request for consideration in format and quantities specified in Section 01 33 00 “Submittal Procedures”. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A or Contractor-generated form with substantially the same information.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by University and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect/Engineer's Action: If necessary, Architect/Engineer in consultation with the University will request additional information or documentation for evaluation within seven calendar days of receipt of a request for substitution. Architect/Engineer in consultation with the University will notify Contractor of acceptance or rejection of proposed substitution within 14 calendar days of receipt of request, or seven calendar days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order.
b. Use product specified if Architect/Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 14 calendar days prior to time required for preparation and review of related submittals.

1. Conditions: Architect/Engineer in consultation with the University will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. [**Contractor's Agreement Design/Bid/Build, State Form SC-6.21 and The General Conditions of the Construction Contract Design/Bid/Build, State Form SC-6.23**] [for definitions and contractual requirements related to contract modification procedures.

1.3 DEFINITIONS

A. Change Order: A written order in compliance with the requirements of the Contract authorizing changes in the Work. For the purposes of this Section a Change Order and a Contract Amendment shall have the same meaning.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Authorized Signatory: Submit name of individual authorized to accept changes and responsible for informing others employed by Contractor of changes in the Work.

1.5 MINOR CHANGES IN THE WORK

A. Architect/Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.6 CHANGE ORDER BULLETIN

A. University-Initiated Change Order Bulletin: Architect/Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. It will also state the time period for which the request will remain valid.

1. Change Order Bulletin Form: State Form SC-6.311 available on the website of the Office of the State Architect.
2. Work Change Order Bulletins issued by Architect/Engineer are not instructions either to stop work in progress or to execute the proposed change.

B. Contractor-Initiated Change Order Bulletin: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect/Engineer.

1. Change Order Bulletin Form: State Form SC-6.311 available from the website of the Office of the State Architect.
2. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

1.7 CHANGE ORDER PROPOSAL

A. Change Order Proposal: In response to a University-Initiated Change Order Bulletin or accompanying a Contractor-Initiated Change Order Bulletin, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change described.

1. Change Order Proposal Form: State Form SC-6.312 available from the website of the Office of the State Architect.
2. Labor Rates: Prior to submitting first Change Order Proposal, submit bare, unburdened hourly labor rates for all contractor and subcontractor labor categories; submit itemized breakdown of all applicable additional labor benefit costs to be added to the bare labor cost to arrive at the total burdened hourly labor cost.
3. Equipment Costs: Provide cost backup for all equipment clearly indicating equipment billing rates and sufficient to demonstrate, as determined by the University Project Manager, that proposed rates are competitive and reasonable in all cases.Submit completed Change Order Proposal Form within the requested timeframe. Include backup documentation to support calculations consistent with Contract provisions, including but not limited to, the following:

   a. Contractor and Subcontractor labor, material and equipment costs including:

      1) A list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      2) Applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      3) Costs of labor and supervision directly attributable to the change and as permitted by the terms and conditions of the General Contract for Construction.

   b. Contractor and Subcontractor overhead and profit.
   c. Contractor’s bond cost.
   d. Justification for Change in Contract Time: An updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

4. Maintain detailed records of work completed. Provide complete information for evaluation of proposed changes and to substantiate proposed changes in Contract Sum or Contract Time.

1.8 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.9 CHANGE ORDER PROCEDURES

A. Submit three signed copies of Change Order Proposal to Architect/Engineer for review.

1. University-Initiated Change Order Bulletins: University and Architect/Engineer will evaluate Contractor's Change Order Proposal and either request additional information or suggest modifications. Based on this review and evaluation University will either accept or reject the proposal.
2. Contractor-Initiated Change Order Bulletins: Architect/Engineer will evaluate Contractor's claim based on the terms and conditions of the Contractor Agreement and General Conditions of the Construction Contract, as applicable.
3. Architect/Engineer's Action: When satisfied as to the accuracy and completeness of the Change Order Proposal, the Architect/Engineer will sign all three copies and forward to the University for consideration.

B. On University's approval of a Change Order Proposal, Architect/Engineer will prepare, sign and forward three copies of a Change Order, State Form SC-6.31 available from the website of the Office of the State Architect, for signature by the Contractor. Contractor then forwards all three copies of signed Change Order to the University for signature and distribution of fully executed copies to Architect/Engineer and Contractor for record.

C. Upon receipt of a fully executed Change Order, promptly perform the following:

1. Revise Schedule of Values on the Application for Payment Form by indicating each authorized Change Order as a separate line item and adjusting the Contract Sum as shown on the Change Order.

   a. University will not pay for changes to the Work until authorized by a Change Order signed by all parties.

2. Revise the Progress Schedule to reflect any change in the Contract Time.
3. Enter changes in the Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
5. For projects required to obtain LEED certification, Division 01 Section "Sustainable Design Requirements" for administrative requirements governing submittal of cost breakdown information required for LEED documentation.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Schedule of values report from cost-loaded Critical Path Method Schedule prepared in accordance with Section 01 32 00 "Construction Progress Documentation" may serve to satisfy requirements for the schedule of values.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.

      1) Construction Manager's Fee.

2) Estimated Project General Conditions Costs.

2. Submit schedule of values and hold a conference with the Architect/Engineer and University Project Manager to finalize the schedule of values at earliest possible date, but no later than 10 business days before the date scheduled for submittal of initial Certificates and Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect/Engineer.
c. Architect/Engineer's project number.
d. Contractor's name and address.
e. Date of submittal.

Retain first subparagraph below for Small Projects and second subparagraph below for Large Projects.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.
3) Equipment.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

6. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not a direct cost of actual work-in-place shall be shown as separate line items in the schedule of values.

7. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect/Engineer and paid for by University.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Pay Application and Schedule Review Meetings: Conduct in accordance with Section 01 31 00 "Project Management and Coordination." Provide draft application for payment and draft schedule update reflecting work accomplished during previous pay period. Review progress achieved; discuss and resolve issues affecting the progress; and review critical activities to be accomplished during the following 90 calendar days.

1. Jobsite Walk: When required, conduct a walk of the jobsite to confirm progress related to any activity in question.

C. Monthly Schedule Reporting: Upon conclusion of the Pay Application and Schedule Review Meeting, but not later than the 28th of the month, update the Construction Schedule and submit the Pay Application.

D. Payment Application Times: Submit Application for Payment to Architect/Engineer by the first day of the month and no more than five (5) business days prior thereto. The period covered by each Application for Payment is per the date indicated in the Application.

E. Payment Application Review: The Architect/Engineer shall, within five (5) business days after the receipt of each Certificate and Application for Payment, review the Project Application for Payment and either execute a Project Certificate for Payment to the University or notify the Contractor in writing of the reasons for withholding a Certificate.

1. All applications for payment, except the final application, and the payments there under, shall be subject to correction in the next application rendered following the discovery of any error

F. Application for Payment Forms: Use State Form SBP-7.2 "Certification for Contractor Payment."

G. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect/Engineer will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under University-requested project acceleration.

H. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site as approved in advance by the University Project Manager and items stored at an off-site location previously agreed upon in writing.

1. Provide certificate of insurance, evidence of transfer of title to University, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

I. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect/Engineer by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. For projects required to obtain LEED certification, LEED submittal for project materials cost data.
4. Contractor's construction schedule (preliminary if not final).
5. Products list (preliminary if not final).
6. For projects required to obtain LEED certification, LEED action plans.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.

K. Application for Payment at Substantial Completion: After Architect/Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for University occupancy of designated portions of the Work.

L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. All items on Pre-acceptance Checklist (State Form SBP-05) have been completed.
2. Notice of Acceptance (State Form SBP-6.27) has been issued.

3. Statements to support local sales tax refunds, if any submitted.
4. Notice of Contractor's settlement has been published.
5. Evidence of completion of Project closeout requirements, including but not limited to:

    a. Submittal of Record Documents.
    b. Submittal of all Operation and Maintenance Manuals.
    c. Completion of all required demonstration and training.

6. Updated final statement, accounting for final changes to the Contract Sum.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when University took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project Web site.
5. Project meetings.

B. Related Requirements:

1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Within 21 calendar days of Notice of Award submit, as complete as possible, a preliminary list to include all major subcontractors. Augment, complete and submit the final subcontractor list within 60 calendar days of Notice of Award, unless a longer duration is approved by the Architect/Engineer. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 14 calendar days after Notice to Proceed, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

A. General: Each entity involved in the performance of work for the entire Project shall cooperate in the overall coordination of the Work; promptly, when requested, furnish information concerning its portion of the Work; and respond promptly and reasonably to the decisions and requests of persons designated with coordination, supervision, administrative or similar authority.

1. University Standard Project Management Forms

   a. Where applicable, obtain from the University Project Manager and use the following University Standard Forms:

      1) Preconstruction Agenda
      2) Change Order Log with Contingency Codes
      3) Access Control Badge Application Form
      4) Utility Interruption Request Form
      5) Utility Start-Up Request Form
      6) Fire Alarm/Sprinkler Disable Request Form
      7) Hot Work Permit Form
      8) Anschutz Medical Campus (AMC) Street and Parking Lot Closure Form
      9) Indoor Air Quality (IAQ) Planning Checklist
      10) Indoor Air Quality (IAQ) Inspection Checklist

2. Site Utilization:

   a. In addition to the site utilization limitations and requirements indicated in Section 01 10 00 “Summary” and indicated by the Contract Documents; administer the allocation of available space equitably among entities needing access and space, so as to produce the best overall efficiency in the performance of the total work of the project. Schedule deliveries so as to minimize the space and time requirements for storage of materials and equipment on the site; but do not unduly risk delays in the work.
   b. Concurrent with work of the Contractor, other contractors, suppliers, and the University personnel may be working in relatively close proximity. The Contractor is solely responsible for coordinating their work with that of other contractors and will make no claims for failure to do so.

3. Layout:

   a. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the drawings. Lay out and arrange all elements to contribute to safety, efficiency and to carry the harmony of design throughout the Work. In case of conflict or undimensioned locations, verify required positioning with Architect/Engineer.

4. Substrate Examination:

a. The Installer of each element of the work must examine the conditions of the substrate to receive the work, dimensions and spaces adjacent, tolerances, interfacing with other elements and services, and the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper or timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

5. Large and Heavy Equipment:

a. Contractor to coordinate with University Project Manager requirements to be maintained for the subsequent entry of large equipment units. Coordinate the movement of heavy items with shoring and bracing, so that the building structure will not be overloaded during the movement and installation.
b. Where equipment or products to be installed on the roof are too heavy to be hand-carried, do not transport across roof deck; position by crane or other device so as to avoid overloading the roof deck.

B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections of the Specification that depend on each other for proper installation, connection, and operation.

1. Contractor Communication with the University: Direct all communication with the University through the University Project Manager.
2. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
3. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
4. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for University and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Coordination Of Submittals: Prior to transmittal to the Architect/Engineer, review shop and erection drawings, product data, and samples for compliance with Contract Documents and for coordination among work of all Sections of the Specifications. Coordination of submittals shall include, but not be limited to the following:

1. Verification of field dimensions and clearances and relationship to available space and anchors.
2. Verification of compatibility with equipment and work of other Sections, electrical characteristics, and operational control requirements.
3. Verification of motor voltages and control characteristics.
4. Coordination of controls, interlocks, wiring of pneumatic switches, and relays.
5. Coordination of wiring and control diagrams.
6. Review of the effect of any changes on work of other Sections.
7. For any item to be installed in or on a finished surface, certify that applicable Contract Documents have been checked and that the item submitted is compatible with the surface finish on which it is to be installed.
8. Equipment and material submittals shall show sufficient data to indicate complete compliance with Contract Documents as follows:

    a. Proper sizes and capabilities.
    b. Ability to fit in the available space in a manner that will allow proper service.
    c. Construction methods, materials, and finishes.
    d. List of accessories.

F. Special Coordination Requirements for Mechanical and Electrical Work:

1. General: Provide necessary work and services required to coordinate the complete installation of heating, ventilating, and air conditioning (HVAC) equipment and systems; plumbing systems and fixtures; electrical equipment, fixtures, and systems; and other equipment or systems containing motors and controls or requiring connection to mechanical or electrical systems; all so that the various systems perform as indicated and are in harmony with other project Work.
2. Contract Drawings:

    a. Drawings are schematic in nature, and indicate in general how the various components are integrated with other parts of the building. Coordinate exact locations by job measurement, by verifying the requirements of other trades, and by review of Contract Documents.

3. Mechanical and Electrical Drawings indicate general routing of the various parts of the systems, but do not indicate all sizes, fittings, offsets, and runouts which are required. Coordinate correct sizes, fittings, offsets, and runouts required to fit systems into allocated spaces. Coordinate locations of all light fixtures, vents, and supply grilles to conform to the ceiling grid system or other modular finishes.
4. Coordinate installation of mechanical and electrical work in compliance with the following requirements:

    a. Install piping, ductwork and similar services straight and true, aligned with other work, close to walls and overhead structure, allowing for insulation, concealed (except where indicated as exposed) in occupied spaces, and out-of-the-way with maximum passageway and headroom remaining in each space.
    b. Install electrical work in a neat, organized manner with conduit and similar services in or parallel with building lines, and concealed unless indicated as exposed.
    c. For all work maintain maximum practical overhead clearance but not less than 6" above ceiling. Where exposed, maintain 7'-0" minimum clearance.
    d. Arrange all work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
    e. Provide space to permit removal of coils, tubes, fan shafts, filters, other parts which may require replacement.
    f. Locate operating and control equipment and devices for easy access. Furnish access panels where units are concealed by finishes and similar work.

g. Integrate mechanical work in ceiling plenums with suspension system, light fixtures and other work, so that required performances of each will be achieved.
h. Give the right-of-way to piping systems required to slope for drainage over other service lines and ductwork.
i. Advise other trades of openings required in their work for accommodation of mechanical and electrical elements. Provide and place sleeves and anchors required in other work.

5. Access to Equipment: Except where located above accessible ceilings, provide access panels wherever access is required to concealed valves, controls, dampers, pull boxes and other devices requiring ongoing or periodic access.

a. Acceptable types of access panels are specified in Division 08.
b. Each trade is responsible for providing access panels needed for access to their equipment and coordinating installation with other Division 03, 04, 06 and 09 trades.
c. Coordinate requirements and obtain approval of locations from Architect/Engineer.

G. Compatibility of Systems:

1. Provide products and equipment which are compatible with other work requiring mechanical/electrical interface including electrical connections, control devices, water, drain and other piping connections. Verify electrical characteristics, fuel requirements and other interface requirements before ordering equipment and resolve conflicts that may arise.
2. Coordinate equipment, mechanical and electrical work in accordance with the following schedule:

ITEM	FURNISHED BY	MOUNTED BY	LOW VOLTAGE WIRED BY	POWER WIRED & CONNECTED BY	LOW VOLTAGE CONTROL CONNECTED BY
Equipment motors	I	MI	MI	EI	--
Motor starters, contactors and overload heaters	MI	EI	EI	EI	MI
Fused and unfused disconnect switches	EI**	EI**	EI**	EI	--
Manual operating switches, speed switches, push-button stations and pilot lights	MI	EI	EI	EI	EI
Duct detectors	EI	MI	MI	EI	MI
Control relays and transformers	MI	MI	MI	EI	MI
Thermostats, time switches*	MI	MI	MI	EI	MI
Temperature control panels	MI	MI	MI	EI	MI
Motor and solenoid valves, damper motors, PE and EP switches	MI	MI	MI	--	MI
Refrigeration equipment, cooling tower and controls	MI	MI	MI	EI	MI

Electric meters	EI	EI	EI	EI	MI
Steam meters	MI	MI	MI	MI	MI
Chilled water meters,	MI	MI	MI	MI	MI
Water meters	MI***	MI	MI	MI	MI
Natural Gas	MI	MI	MI	MI	MI

I = Installer of equipment requiring electrical service
EI = Electrical Installer
MI = Mechanical Installer

* Motor driven units which are controlled from line voltage automatic controls such as line voltage thermostats, float switches or time switches which conduct full load current of the motor shall be wired for both power and control circuit under the electrical contract. However, if the control device does not conduct full load current, then the responsibility shall be that set forth in the above schedule. (Example: a 208 volt, 3-phase, 3- wire motor requires 120 volt control. Electrical Installer shall furnish a 120 volt circuit for control and 208 volt circuit for power and wire the power circuit. Mechanical Installer shall wire the control circuit.)

** Disconnects for AH units are factory mounted.

***Building Service meter provided by Civil. Any sub meter provided by MI. Coordinate meter requirements with utility for remote monitoring by 23 09 00 – Instrumentation and Controls.

H. Special Coordination Requirements for Exterior Envelope Work:

1. General: Provide necessary work and services required to coordinate the complete and continuous installation of the building's heat, air and moisture barriers. Exterior building envelope construction to be coordinated includes, but is not limited to, below-grade walls, slabs-on-grade, exterior opaque walls, windows, curtain walls, roofs, and skylights.

2. Contract Drawings:

   a. Drawings indicate general concepts and design intent for continuity of heat, air and moisture barriers at each exterior building envelope component and at transitions between building envelope components. Coordinate details for continuity based on actual product selections and Contractor's proposed sequence of construction.

I. Complete Systems:

1. It is the intent of the Contract Documents that all systems, including mechanical and electrical, be complete and functional to provide the intended or specified performance. Provide all incidental items and parts necessary to achieve this requirement.
2. Provide correctly sized power, utilities, piping, drains, services and their connections to equipment and systems requiring them, whether or not specific items are listed in the schedule under "Compatibility of Systems" paragraph in this Section.

J. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as University's property.

2. Establish recycling program at job site. Refer to Section 01 74 19 "Construction Waste Management and Disposal" for additional requirements.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple subcontractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect/Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Electrical Work: Show the following:

   a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.

3. Fire-Protection System: Show the following:

   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

4. Windows, Curtain Wall, and Exterior Wall Assembly Transition Work: Show all components of each adjacent wall or window system and all required compatible tie-ins between them including transition strips, flashings and sealants. Clearly identify each product, its configuration and its extent. Shop Drawings which only generically indicate adjacent construction and/or indicate "construction by others" will not be acceptable.
5. Review: Architect/Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect/Engineer determines that coordination drawings are not being prepared in sufficient

scope or detail, or are otherwise deficient, Architect/Engineer will so inform Contractor, who shall make changes as directed and resubmit.

6. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

B. Interference Resolution: Whenever job measurements and an analysis of the building coordination model, Drawings and Specifications indicate that the various systems cannot be installed without significant deviation from the intent of the Contract, prepare interference drawings as required to indicate conflict between the various systems and other components of the building such as beams, columns, and walls. Include plans, elevations, sections, and other details drawn to large scale as required to clearly define the interference and to indicate the Contractor's proposed solution. Submit interference drawings for review by the Architect prior to proceeding with work in the general areas of the conflict.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect/Engineer will return RFIs submitted to Architect/Engineer by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect/Engineer.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

14. Space for response and signature by Architect/Engineer.

C. RFI Forms: Hard copy form or software-generated form with substantially the same content as indicated above, acceptable to Architect/Engineer.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect/Engineer's Action: Architect/Engineer will review each RFI, determine action required, and respond. Allow seven calendar days for Architect/Engineer's response for each RFI. RFIs received by Architect/Engineer after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect/Engineer's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect/Engineer's action may include a request for additional information, in which case Architect/Engineer's time for response will date from time of receipt of additional information.
3. Architect/Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Contractor-Initiated Change Order Bulletin and Proposal according to Section 01 26 00 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect/Engineer in writing within seven calendar days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log weekly. [**Use CSI Log Form 13.2B**] Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect/Engineer.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect/Engineer's response was received.

F. On receipt of Architect/Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect/Engineer within seven calendar days if Contractor disagrees with response.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify University and Architect/Engineer of scheduled meeting dates and times a minimum of 4 business days prior to meeting.

a. Participants, including representatives of subcontractors and suppliers, shall be qualified, familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including University and Architect/Engineer, within three business days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time and site convenient to all parties, but not later than 14 calendar days after Notice to Proceed.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

   a. Authorized representatives of University:

      1) University Project Manager.
      2) University Building Maintenance Operations (BMO) Representative.

   b. Architect/Engineer and their consultants.
   c. Contractor's project manager and superintendent.
   d. Major subcontractors and suppliers.
   e. Other concerned parties shall attend the conference.

3. Agenda: Discuss items of significance that could affect progress, including the following:

   a. Designation of key personnel and their duties.
   b. Lines of communications.
   c. List of major subcontractors and suppliers.
   d. Tentative construction schedule.

      1) Phasing.
      2) Critical work sequencing and long-lead items.
      3) Equipment deliveries and priorities.

   e. Procedures and processing of:

      1) Change Order Bulletin, Change Order Proposal and Change Orders.
      2) RFI's
      3) Testing and inspecting.
      4) Applications for Payment.
      5) Submittals.
      6) Preparation of record documents.

   f. Use of the premises, existing building and adjacent buildings as applicable.

      1) Work restrictions.
      2) Working hours.
      3) University's occupancy requirements.
      4) Procedures for disruptions and shutdowns.
      5) Construction parking and staging.
      6) Construction route and site access.
      7) Office, work, and storage areas.
      8) Progress cleaning and housekeeping procedures.

   g. Project coordination.
   h. Distribution of the Contract Documents.
   i. Temporary facilities and controls.
   j. Indoor Air Quality Plan and Monitoring including procedures for moisture and mold control.
   k. Construction waste management and recycling.

l. Safety.

1) Fire and Life Safety.
2) Health and Safety.

m. First aid.
n. Security.
o. Building Department.
p. Telecommunications.
q. Building Services.
r. Building Operations.
s. University Work Related Policies.
t. Contractor Contacts.
u. University Contacts.
v. University Process Forms.

1) Key Request Form.
2) Access Control Badge Application Form.
3) Utility Interruption Request Form.
4) Utility Start-Up Form.
5) Fire Alarm/ Sprinkler Disable Request Form.
6) Hot Work Permit Form.
7) Anschutz Medical Campus (AMC) Street and Parking Lot Closure Form.
8) Indoor Air Quality (IAQ) Plan.
9) IAQ Planning Checklist.
10) IAQ Inspection Checklist.
11) Request for Variance.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. LEED Coordination Conference: For projects pursuing LEED certification, schedule and conduct a LEED coordination conference before starting construction, at a time convenient to University Architect/Engineer, and Contractor.

1. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

a. University Project Manager.
b. Architect/Engineer and their consultants.
c. Contractor's project manager, superintendent and LEED coordinator.
d. Major subcontractors and suppliers.
e. Other concerned parties.

2. Agenda: Discuss items of significance that could affect meeting requirements for LEED certification, including the following:

a. LEED Project Checklist.
b. Procedures for selecting and monitoring status for achieving Project goals related to recycled content and regional materials.
c. General requirements for LEED-related procurement and documentation.
d. Project closeout requirements and LEED certification procedures.
e. Role of LEED coordinator.
f. Construction waste management.
g. Construction operations and LEED requirements and restrictions.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

D. Preinstallation Conferences: Conduct a preinstallation conference at Project site for installations, systems or assemblies where required by individual Specification Sections, or where deemed necessary by Contractor.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect/Engineer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following, as appropriate:

   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. LEED requirements, for projects pursuing LEED certification.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility requirements.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   p. Compatibility of materials.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.

3. Record significant conference discussions, approved schedules, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information, including University Project Manager and Architect/Engineer.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to University and Architect/Engineer, but no later than **[30]** calendar days prior to the scheduled date of Substantial Completion or Partial Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

a. University Project Manager.
b. University Building Maintenance Operations (BMO) Representative.
c. Architect/Engineer and their consultants.
d. Contractor's project manager and superintendent.
e. Major subcontractors and suppliers.
f. Other concerned parties.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Procedures related to:

1) Notice of Completion, including preparation of Contractor's punch list.
2) Final Inspection.
3) Notice of Substantial Completion.
4) Notice of Approval of Occupancy/Use.
5) Supplemental Occupancy/Use Checklist.
6) Supplemental Acceptance Checklist.
7) Pre-acceptance Checklists.
8) Notice of Acceptance.
9) Settlement and Final Payment.

b. Preparation of record documents.
c. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
d. Submittal of written warranties.
e. Requirements for completing LEED documentation, for projects pursuing LEED certification.
f. Requirements for preparing operations and maintenance data.
g. Requirements for delivery of material samples, attic stock, and spare parts.
h. Requirements for demonstration and training.
i. University's partial occupancy requirements.
j. Installation of University's furniture, fixtures, and equipment.
k. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

F. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

a. University Project Manager.
b. University Health Safety Department Representative.
c. University Building Maintenance Operations Representative.
d. University Campus Building Official.
e. Architect/Engineer and their consultants.
f. Contractor's project manager and superintendent.
g. Major subcontractors and suppliers.
h. Other entities concerned with current progress or involved in planning, coordination, or performance of future activities.
i. As needed, University Building Maintenance Operations (BMO), Subject Matter Experts (SME), and University Facility Support Services (FSS) Representatives.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule:

      1) Review progress since the last meeting.
      2) Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.
      3) Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      4) Review schedule for next two week period.
      5) Review schedule of deliveries.
      6) Review off-site fabrication.

   b. Site Safety.
   c. Indoor Air Quality Management monitoring.
   d. MS4 Storm Water and Water Quality monitoring.
   e. Quality:

      1) Quality and work standards.
      2) Status of correction of deficient items.
      3) Progress cleaning.
      4) Field observations.

   f. Status of submittals.
   g. Status of RFIs.
   h. Status of Changes including:

      1) Change Order Bulletins.
      2) Change Order Proposals.
      3) Change Orders.
      4) Pending claims and disputes.

   i. Status of LEED documentation, for projects pursuing LEED certification.
   j. Review present and future needs of each entity present including:

      1) Access.
      2) Site utilization.
      3) Temporary facilities and controls.
      4) Coordination.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

G. Pay Application and Schedule Review Meeting: Conduct review meeting monthly on or about the 25th of each month.

1. Attendees:

   a. University Project Manager.
   b. Architect/Engineer.
   c. Contractor’s Project Manager, Superintendant and Scheduler.

2. Agenda: Review draft pay application and progress schedule update in accordance with the requirements of Section 01 29 00 "Payment Procedures" and Section 01 32 00 "Construction Progress Documentation."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Monthly project status reports.
6. Material location reports.
7. Site condition reports.
8. Special reports.

B. Related Requirements:

1. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
2. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Startup construction schedule (bar chart).

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Detailed Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

1.4

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial University occupancy, as may be applicable.
4. Review delivery dates for University-furnished products.
5. Review schedule for work of University's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and University startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date is not permitted. Contract completion date may only be modified by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 21 calendar days, unless specifically allowed by Architect/Engineer.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include adequate time for startup, testing and commissioning.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect/Engineer's administrative procedures necessary for issuing Notice of Substantial Completion.

C. Constraints: Include the following constraints and work restrictions as indicated in the Contract Documents and as applicable in schedule; show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by University: Include a separate activity for each portion of the Work performed by University.
3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. University-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items, as applicable, on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Environmental control.

6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Submittals.
    b. Mockups.
    c. Fabrication.
    d. Sample testing.
    e. Deliveries.
    f. Installation.
    g. Tests and inspections.
    h. Building flush-out.
    i. Startup and placement into final use and operation.

7. Construction Areas: As applicable, identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.

d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Commencement of Work, Substantial Completion, Notice of Occupancy and Use, and Final Acceptance. As applicable, also include milestones for Partial Substantial Completion and Partial Notice of Occupancy and Use.

E. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules and as approved by University and Architect/Engineer.

2.2 STARTUP CONSTRUCTION SCHEDULE (BAR CHART)

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven calendar days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (BAR CHART OR GANTT CHART)

A. Bar-Chart or Gantt-Chart Schedule: Submit startup, horizontal, bar-chart-type or a comprehensive, fully developed, horizontal, Gantt-chart-type construction schedule within 30 calendar days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Use the same breakdown of construction activities as indicated in the Schedule of Values.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar. With each required construction schedule update, place a contrasting mark in each bar to indicate actual completion.

C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.

4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

F. Summary Reports: With each schedule update, at a minimum provide the following hard copy cost and resource reports:

1. Cost report showing activity dollar value, dollar value of work in place to-date and dollar value for current period.
2. Cost report showing activity dollar value, dollar value of work in place to-date, and dollar value for current period summarizing to schedule of values.
3. Resource report showing man-day allocations by specific trade on each activity.
4. Variance report comparing current dates to target dates.
5. Cash flow report showing monthly projections of expenditures.
6. Narrative schedule report documenting:
   a. Description of the actual work accomplished during the reporting period.
   b. Description of any problem areas.
   c. Description of current and anticipated delays with recommended corrective actions to mitigate such delays.
   d. A list of proposed modifications, additions, deletions, and changes in logic to the approved construction schedule.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.

14. Change Orders received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial completions and occupancies.
18. Substantial Completions authorized.

B. Monthly Project Status Report: Prepare a monthly project status report including the following:

1. Current status of Project:

a. Schedule.
b. Cost.
c. MBE and WBE participation, as applicable.
d. RFI's.
e. Submittals.
f. Manpower.
g. Safety.

2. Narrative of progress achieved in previous month, activities anticipated for the next month, and issues affecting the rate of progress.
3. Progress photographs in accordance with Section 01 32 33 "Photographic Documentation."

C. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

D. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to University within one calendar day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise University in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule draft update schedule for discussion and review at monthly project progress schedule and pay application review meeting.

1. Revise schedule immediately after each meeting and issue updated schedule concurrently with submittal of monthly Application for Payment.
2. Include summary reports with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.
4. Schedule updates may change logic but may not change milestone or critical path without prior approval of University and Architect/Engineer.

B. Distribution: Distribute copies of approved schedule to Architect/Engineer University, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Requirements:

1. Section 01 33 00 "Submittal Procedures" for submitting photographic documentation.
2. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For photographer.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

C. Digital Photographs: Submit image files within three business days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 12 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect/Engineer.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to University for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect/Engineer.

D. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect/Engineer.

1. Flag construction limits before taking construction photographs.
2. Take [**20**] photographs to show existing conditions adjacent to property before starting the Work.
3. Take [**20**] photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take [**20**] <**Insert number**> photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect/Engineer-Directed Construction Photographs: From time to time, Architect/Engineer will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take [**20**] <**Insert number**> color photographs after date of Substantial Completion for submission as project record documents. Architect/Engineer will inform photographer of desired vantage points.

1. Do not include date stamp.

H. Additional Photographs: University through Architect/Engineer may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Three business days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Substantial Completion of a major phase or component of the Work.
e. Extra record photographs at time of final acceptance.
f. University's request for special publicity photographs.

END OF SECTION 01 32 33

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Division 02 through 33 for additional submittal requirements specific to indicated Specification Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect/Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals." Submittals not specifically indicated as informational submittals are considered to be action submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect/Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals" and include, but are not limited to:

1. Schedules.
2. Permits.
3. Applications for payment.
4. Performance and payment bonds.
5. Insurance certificates.
6. List of Subcontractors.
7. Schedule of Values.
8. Inspection and test results.
9. Closeout documents.

10. Coordination drawings.
11. Street and Storm Water Quality Management Plan.
12. Indoor Air Quality Management Plan.
13. Anschutz Medical Campus Street Services Request.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect/Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

   a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

3. Format: Arrange the following information in a tabular format:

   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for resubmittal.
   g. Scheduled date for Architect/Engineer's final release or approval.
   h. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect/Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect/Engineer for Contractor's use in preparing submittals.

1. Architect/Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings [**and Project record drawings**].

   a. Architect/Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
   b. Digital Drawing Software Program: The Contract Drawings are available in <**Insert name and version of digital drawing software program and operating system**>.

c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to University and Architect/Engineer.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit for review with sufficient time to avoid construction delays.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect/Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 14 calendar days for review of each resubmittal.
4. Large and/or Complex Submittals: For large and/or complex submittals, as determined by the Architect/Engineer and for submittals that require sequential reviews by Architect/Engineer's consultants, a review period greater than 14 calendar days may be required. Architect/Engineer and Contractor shall identify such submittals upon submission of the submittal schedule and determine a mutually agreed upon review period.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately [**6 by 8 inches**] <**Insert dimensions**> on label or beside title block to record Contractor's review and approval markings and action taken by Architect/Engineer.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Date.
c. Name of Architect/Engineer.
d. Name and address of Contractor.
e. Name and address of subcontractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect/Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect/Engineer.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer will return without review submittals received from sources other than Contractor.

   a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect/Engineer.
      6) Name and address of Contractor.
      7) Name of firm or entity that prepared submittal.
      8) Names of subcontractor, manufacturer, and supplier.
      9) Category and type of submittal.
      10) Submittal purpose and description.
      11) Specification Section number and title.
      12) Specification paragraph number or drawing designation and generic name for each of multiple items.
      13) Drawing number and detail references, as appropriate.
      14) Indication of full or partial submittal.
      15) Transmittal number.
      16) Submittal and transmittal distribution record.
      17) Remarks.
      18) Contractor's certification that information complies with Contract Document requirements.
      19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

   a. File name shall use project identifier and Specification Section number followed by a dash and then a sequential number (e.g., LNHS-061000-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., LNHS-061000-01-A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineer.

4. Transmittal Form for Electronic Submittals: Use [**electronic form**] acceptable to University**,** containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect/Engineer.
    d. Name and address of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification Section number and title.
    j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number.
    p. Submittal and transmittal distribution record.
    q. Other necessary identification.
    r. Contractor's certification that information complies with Contract Document requirements.
    s. Remarks.

F. Options: Identify options requiring selection by Architect/Engineer.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Contractor Certification: On transmittal include Contractor's certification that information complies with Contract Document requirements.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

    1. Note date and content of previous submittal.
    2. Note date and content of revision in label or title block and clearly indicate extent of revision.
    3. Resubmit submittals until they are marked with approval notation from Architect/Engineer's action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineer's action stamp.

L. Record Documents: Retain complete additional copies of submittals on Project site to be submitted as record documents in accordance with requirements of Section 01 78 39 “Project Record Documents.”

M. Legibility: Provide clear and legible submittals. Submittals that are blurry or are for any reason unreadable will be returned without action.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files.

a. Architect/Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit three paper copies of each submittal to Architect/Engineer and one to University unless otherwise indicated. Architect/Engineer will return one copy.
3. Informational Submittals: Submit two paper copies of each submittal to Architect/Engineer and one to University unless otherwise indicated. Architect/Engineer will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's printed recommendations.
e. Standard color charts.
f. Statement of compliance with specified referenced standards.
g. Statement of compliance with specified trade association standards.
h. Testing by recognized testing agency.
i. Application of testing agency labels and seals.
j. Notation of coordination requirements.
k. Notation of dimensions verified by field measurement.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Rough-in diagrams and templates indicating clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Confirm compliance of Product Data with requirements of Contract Documents. Submit cover letter indicating Contractor's certification of compliance.
7. Submit additional copies of Product Data as required complying with requirements of Section 01 78 39 "Project Record Documents."

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Highlight, encircle or otherwise indicate deviations from Contract Documents. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect/Engineer's digital data drawing files is otherwise permitted. Standard information prepared without specific reference to the Project is not considered a shop drawing.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than size of Construction Drawings.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Mount, display or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect/Engineer's Sample.
3. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Specification paragraph number and generic name of each item.
   f. Compliance with recognized standards.
   g. Availability and delivery time.

4. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect/Engineer will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architect/Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

7. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as University's property, are the property of Contractor.

8. Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, Installers, and others as required for performance of the Work. Show distribution on transmittal forms.
9. Field Samples and Mock-Ups: Field Samples and mock-ups specified in individual Sections are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

E. Selection of Related Materials: Where selections of colors, patterns, textures are specified to be made by Architect/Engineer, assemble complete samples of all specified or approved products for all Specification Sections and submit to Architect/Engineer. Review specifications and assemble all such samples for a combined single submittal. Indicate on the transmittal the latest date for selections to be made for each item to permit delivery of material in accordance with Progress Schedule. Architect/Engineer's action is limited solely to the specified selections or rejection of submittal items not in accordance with Specifications.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

L. LEED Submittals: For project required to obtain LEED certification, comply with requirements specified in Division 01 Section "Sustainable Design Requirements".

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer. Submittals received without Contractor’s substantive review and approval stamp will be rejected and returned to the Contractor.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT/ENGINEER'S ACTION

A. Action Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect/Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect/Engineer will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect/Engineer.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect/Engineer without action.

END OF SECTION 01 33 00

SECTION 01 35 44

SPECIAL PROCEDURES FOR ENVIRONMENTAL HEALTH AND SAFETY AND FIRE AND LIFE SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes special administrative and procedural requirements related to environmental health and safety.

B. University is Authority Having Jurisdiction (AHJ) for Fire and Life Safety. This responsibility is administered by the University's Fire and Life Safety Officer.

C. Related Requirements:

1. Section 01 35 46 "Indoor Air Quality Procedures" for procedure related to maintaining indoor air quality during construction.
2. Section 02 81 00 "Transportation/Disposal of Hazardous Materials."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ENVIRONMENTAL HEALTH AND SAFETY AND FIRE AND LIFE SAFETY PROCEDURES

A. Physical, Life, and Fire Safety:

1. All contractors are required to conform to the Federal Occupational Safety and Health Administration (OSHA) regulations for construction (29 CFR 1926). Certain General Industry Standards (29 CFR 1910) may also apply, depending on location of work.
2. Provide an effective health and safety program to control hazards, including but not limited to compressed gases, welding, electrical, safety netting, cranes, scaffolding and supplies on the roof.
3. Provide fire protection in all construction areas to the satisfaction of the Authority Having Jurisdiction.
4. During the construction phase, the Authority Having Jurisdiction may conduct oversight inspections to observe and provide recommendations regarding applicable safety standards. The following minimum items are included:

    a. Do not block exit corridors. Install signage clearly identifying exit routes.
    b. Provide physical barriers with appropriate warning signage to protect public areas from construction work.

c. Conduct daily inspections to eliminate fire hazards and any other safety hazards.
d. Periodic safety inspections will be performed on job sites by the Authority Having Jurisdiction. The Authority Having Jurisdiction for fire safety will present University's Project Manager with a written summary of the findings who will then take these issues to the Contractor's superintendent, foreman or other designated representative and return the summary form with documentation of the resolution of safety items to AHJ. Abate deficient items in a timely manner. Include documentation and resolution of safety items presented in weekly Progress Meeting minutes. Inspections by University AHJ are spot-checks only. They are not all encompassing. These inspections and recommendations do not relieve the Contractor from obligations related to safe work practices, as required under federal law.
e. AHJ has the right to access the site at all times. Should a potential threat to personnel or property be observed, AHJ may require the hazard related operation immediately altered until adequate safeguards are addressed.
f. Supply AHJ, through the University Project Manager, with a copy of Contractor's weekly safety meeting minutes and safety inspection reports.
g. Provide signs used for proper identification of construction areas.
h. Provide adequate number of appropriately rated fire extinguishers to be available on-site for emergency use in the construction area.
i. Insure standpipes, pull stations, electrical panels, water control valves and fire hydrants are accessible at all times.
j. Post emergency notification phone numbers provided by Contractor and University in all construction areas.
k. Notify University Project Manager of any lost time injuries occurring on University's property within one (1) calendar day and of any fatalities immediately.
l. Submit copies of all injury reports to AHJ, through University's Project Manager.
m. Equip construction personnel with personal protective equipment (PPE) where required. Coordinate with University Project Manager to identify where use of PPE will be required.

B. OSHA Hazard Communication Standard:

1. Every Contractor and Subcontractor performing work shall to comply with the OSHA Hazard Communication Standard. Compliance includes joint University and Contractor responsibilities for the purpose of providing timely communications and information sharing with regard to hazardous materials, chemicals and chemical sources which may be present on-site or brought in by Contractor.
2. University Project Manager will provide Contractor with the following:

   a. Information regarding known hazardous chemicals and agents or other hazards present at the job site.
   b. University emergency procedures and contact numbers.

3. Provide safety training and environmental surveillance of all workers.
4. Inform and provide University's Project Manager the following:

   a. Material safety data sheets (MSDS) for all chemicals introduced into the workplace.
   b. Information regarding potential sources of pollutants which may be entrained in University's air intakes, e.g., roofing tar fumes, nuisance dusts, exhaust from internal combustion engines, welding or cutting fumes, and asbestos - if damaged or encountered during the course of the work.

C. Asbestos and Lead Paint:

1. The presence of asbestos-containing materials and/or paint containing lead on the job site does not mean a problem exists. Areas where asbestos is friable and not contained or lead paint is present or will be caused to be present in airborne or settled dust are of concern.

2. Responsibilities of University and Contractor regarding asbestos and lead paint are as follows:

   a. University:

      1) Notify the Contractor of the condition and location(s) where asbestos is known to be present or may reasonably be encountered, e.g., asbestos insulation, ceiling tiles, floor tiles, fire doors, wall and ceiling plasters, concrete, grouting, etc., and lead paint on metal building materials, walls, windows, etc.
      2) Coordinate with Contractor when response action is required by a Subcontractor.
      3) Contract with third party contractor to monitor areas where friable asbestos and/or lead-containing particles are present during construction/renovation projects for its own records and purpose. Monitoring results can be shared with Contractors but are in no way to be used for Contractor employee monitoring.
      4) Final authority on all asbestos-related concerns and contractual arrangements.

   b. Contractor:

      1) Notify University's Project Manager of any suspected or existing problem involving asbestos or lead and cease work in that area until University has assessed the situation.
      2) Ensure that undamaged asbestos-containing material and/or material containing lead, not included in the scope of the project, are not damaged.
      3) Train and monitor their own employees, including Asbestos Awareness training and Lead Paint Awareness training, where applicable.
      4) Be responsible for all environmental/industrial hygiene surveillance of its work staff and subcontractors and for required area monitoring where potential contamination of adjacent areas exists.
      5) Prevent problems which can result in asbestos or lead exposure to building occupants.
      6) Coordinate with the University's EHS Department and Building Maintenance and Operations through University's Project Manager and perform all activities that may potentially disturb asbestos containing materials in a manner acceptable to the EHS.
      7) Follow State of Colorado regulation, Emission Standards for Asbestos, Part B, Control of Asbestos, "Regulation 8" and OSHA standards regulating exposure to asbestos and lead.
      8) Where applicable, comply with Section 02 81 00 "Transportation/Disposal of Hazardous Materials."
      9) Comply with current "Asbestos-Contaminated Soil Management Standard Operating Procedure Document, University of Colorado Anschutz Medical Campus" during excavation operations.

D. Carcinogens:

   1. Contractor or any Subcontractor shall not knowingly install or cause to be installed any material or product containing carcinogens. Refer to Annual Report on Carcinogens, U.S. Department of Health and Human Services, National toxicology Program.

E. Hazardous Waste:

   1. All hazardous wastes are to be handled and disposed of according to current EPA and CDPHE guidelines which can be obtained through University Project Manager. Only individuals specifically authorized by University may sign hazardous waste manifests for wastes generated on University's property. Only University approved transporters and disposal facilities are to be used for transportation and disposal of hazardous wastes.

F. The Control of Hazardous Energy (Lockout/Tagout):

1. Provide and enforce a program and procedures for the control of hazardous energy (lockout/tagout) including, but not limited to, locks, tags and lockout devices. Provide proof that workers have received safety training in the control of hazardous energy through lockout/tagout.

G. Hot Work Operations:

1. Comply with University hot work policy and obtain Hot Work Permit prior to executing any hot work in existing buildings.
2. Notify University Project Manager prior to any hot work on University property.
3. Provide and enforce a program to control fires during hot work operations. Provide appropriately rated fire extinguishers, fire retardant protective covers (when needed), and any other hot work related equipment.

H. Confined Space Entry:

1. Work in compliance with the "Confined Spaced Entry Procedure for Non-University Personnel" whenever any project requires entry into a confined space. A copy of this procedure can be obtained from University EHS through University's Project Manager.

I. Green Tagging of Work Area:

1. Obtain a Green Tag and Construction Permit from the University Project Manager prior to any work being conducted in a laboratory or on any exhaust ductwork system serving a laboratory. If a Green Tag has been issued, it will be displayed at the entry of the laboratory area. The Green Tag assures that any radioactive, chemical or biological materials have been removed from the laboratory verifying the area is free from hazards to workers. If a Green Tag is not displayed, coordinate tagging with EHS through University's Project Manager.

END OF SECTION 01 35 44

SECTION 01 35 46

INDOOR AIR QUALITY PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing emissions and moisture control during construction.

1.3 DEFINITIONS

A. Sustainable Design Related Terminology: As defined is ASTM E 2114.

B. Adequate Ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.

C. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.

1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).

D. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.

E. Interior Final Finishes: Materials and products that will be exposed at interior, occupied spaces including but not limited to flooring, wallcovering, finish carpentry, and ceilings.

F. Packaged Dry Products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging including but not limited to carpets, resilient flooring, ceiling tiles, and insulation.

G. Wet Products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

1.4 QUALITY ASSURANCE

A. Inspection and Testing Lab Qualifications: Minimum of 5 years experience in performing the types of testing specified herein.

1.5 PRECONSTRUCTION MEETING

A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with University and Architect/Engineer to review and discuss the proposed IAQ Management Plan and develop a mutual understanding of detailed requirements for maintaining indoor air quality and environmental protection.

1.6 SUBMITTALS

A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 business days before the Pre-construction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:

1. Procedures for control of emissions during construction.

a. Identify schedule for application of interior finishes.

2. Procedures for moisture control during construction.

a. Identify porous materials and absorptive materials.
b. Identify schedule for inspection of stored and installed absorptive materials.

3. Revise and resubmit Plan as required by University.

a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Product Data:

1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Submit air pressure difference maps for each mode of operation of HVAC.
3. Material Safety Data Sheets: Submit MSDSs for inclusion in Operation and Maintenance Manual for the following products. Coordinate with Section 01 78 23 – Operation and Maintenance Data.

a. Adhesives.
b. Floor and wall patching/leveling materials.
c. Caulking and sealants.
d. Insulating materials.
e. Fireproofing and firestopping.
f. Carpet.
g. Paint.
h. Clear finish for wood surfaces.
i. Lubricants.
j. Cleaning products.

C. Inspection and Test Reports:

1. Moisture control inspections.

2. Moisture content testing.
3. Moisture penetration testing.
4. Microbial growth testing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

A. Provide point person responsible for the implementation and assurance that the Indoor Air Quality Plan is being implemented.

B. University Indoor Air Quality Plan: Comply with the requirements of the University IAQ Plan, latest version, appended to this Specification Section.

C. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

A. Housekeeping:

1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
2. Verify that installed materials and products are dry prior to sealing and weatherproofing the building envelope.
3. Install interior absorptive materials only after building envelope is sealed and weatherproofed.

B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to University, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly.

   a. Where stored on-site or installed absorptive materials become wet, notify Architect/Engineer and University. Inspect for damage. If acceptable to University, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.

4. Basement: Monitor basement and crawlspace humidity, and dehumidify when relative humidity is greater than 85 percent for more than 2 weeks or at the first sign of mold growth.
5. Site drainage: Verify that final grades of site work and landscaping drain surface water and ground water away from the building.
6. Weather-proofing: Inspect moisture control materials as they are being installed. Include the following:

a. Air and weather-resistive barrier: Verify air and weather-resistive barrier is installed without punctures and/or other damage. Verify air barrier and weather-resistive is sealed completely.
b. Flashing: Verify correct shingling of the flashing for roof, walls, windows, doors, and other penetrations.
c. Insulation layer: Verify insulation is installed without voids.
d. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair

7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
8. HVAC: Inspect HVAC system as specified in Section 23 08 00 – Commissioning.

a. And, inspect HVAC to verify:

1) Condensate pans are sloped and plumbed correctly.
2) Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils.
3) Ductwork and return plenums are air sealed.
4) Duct insulation is installed and sealed.
5) Chilled water line and refrigerant line insulation are installed and sealed**.**

C. Schedule:

1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air and weather-resistive barriers, flashing, exterior sealants and roofing, at the earliest possible time.

D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure that they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

1. Concrete: Moisture test prior to finish flooring application as specified in Division 09.

2. Wood: Moisture test as per ASTM D4444 - Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are < 20% at center of piece; < 15% at surface.

3. Gypsum Board, Gypsum Plaster, Insulation, and other absorptive materials: Moisture test with a Pinless Moisture Meter to assess patterns of moisture, if any.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference at 100 percent static-air-pressure difference specified in applicable Division 08 Sections; unless otherwise indicated, acceptable upper limits are no leakage for 15 minutes**.**

a. Number of Tests: 1 percent of openings but not less than two.

2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are no leakage for 15 minutes.

   a. Test frequency: 100 percent of horizontal waterproofed surfaces.

3. Masonry: Test as per ASTM C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are no leakage for 15 minutes.

4. Exterior Walls:

   a. Air tightness of the enclosure test: ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827

      1) Air Leakage: The mean value of the air leakage flow rate calculated from measured data at 0.3 in wg (75 Pa) must not exceed 0.25 cu ft/ minute per square foot of envelope area. Measurements must be referenced at standard conditions of 14.696 psi (101.325 KPa) and 68 deg F.

F. Testing for Support of Microbial Growth: Test and report in accordance with ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers. Indicate susceptibility of product or material to colonization and amplification of microorganisms. Identify microorganisms and conditions of testing.

1. Normal conditions: Perform testing at 35 degrees Centigrade and 50 percent relative humidity.
2. Extreme conditions: Perform worst case scenarios screening tests by providing an atmosphere where environmental conditions may be favorable for microbial growth.
3. Perform testing for the following:

   a. Fireproofing material on appropriate substrate.
   b. Ceiling tile.
   c. Wall covering.
   d. Other appropriate material.

END OF SECTION 01 35 46

Indoor Air Quality Plan
March 1, 2012

Project _____

Completed by: _____
(Name & Company)

Date: _____

This plan describes the measures to be taken to provide good indoor air quality (IAQ) during construction and after construction is complete and the occupants have moved into the building. This plan is based on the SMACNA standard "IAQ Guidelines for Occupied Buildings under Construction" and the requirements of the LEED.

It is not the intent of this document to replace or supersede OSHA regulations as to safe construction workplace practices. It remains the responsibility of the Construction Manager and the individual sub-contractors to maintain safe building and site operations. Addition precautions may be necessary when hazardous materials are present.

The plan will address construction IAQ by recommending procedures in five areas of concern, which in turn will allow the building to achieve two LEED program points:

- HVAC system protection
- Containment source control
- Pathway interruption
- Housekeeping
- Scheduling

The following describes the specific measures to be performed in each area of concern:

1. HVAC Protection

- During construction, provide MERV 13 filters for supply air intake when in use. Provide MERV 8 filters at the return air system openings when in use. Perform frequent maintenance when the HVAC system is being utilized and replace filters as they become loaded, prior to building flushout, and prior to occupancy.
- When performing construction activities that produce dust, such as drywall sanding, concrete cutting, masonry work, wood sawing or adding insulation, seal off the supply diffusers and return air system openings completely for the duration of the task.
- Shut down and seal off the supply diffusers and return air ducts during any demolition operations.
- Whenever the HVAC system is not used during construction, seal off the supply diffusers and return air system openings to prevent the accumulation of dust and debris in the duct system.
- Do not use the mechanical rooms to store construction or waste materials. Keep rooms clean and neat.
- Provide periodic duct inspections during construction; if the ducts become contaminated due to inadequate protection, clean the ducts professionally in accordance with NADCA (National Air Duct Cleaning Association) standards.
- The General Contractor shall take photographs showing measures in place.

2. Source Control

- Use low VOC products as indicated by the specifications to reduce potential problems.

- Restrict traffic volume and prohibit idling of motor vehicles where emissions could be drawn into the building.
- Utilize electric or natural gas alternatives for gasoline and diesel equipment where possible and practical. Use low-sulfur diesel in lieu of regular diesel.
- Cycle equipment off when not being used or needed.
- Exhaust pollution sources to the outside with portable fan systems. Prevent exhaust from recirculating back into the building from construction equipment outside the building.
- Keep containers of wet products closed as much as possible. Cover or seal containers of waste materials that can release odor or dust.
- Protect stored on-site or installed absorptive building materials from weather and moisture; wrap with plastic and seal tight to prevent moisture absorption.
- The General Contractor shall take photographs showing measures in place.

3. Pathway Interruption

- Provide dust curtains or temporary enclosures to prevent dust from migrating to other areas when applicable.
- Locate pollutant sources as far away as possible from supply ducts and areas occupied by workers when feasible. Supply and exhaust systems may have to be shut down or isolated during such activity.
- During construction, isolate areas of work to prevent contamination of clean or occupied areas. Pressure differentials may be utilized to prevent contaminated air from entering clean areas.
- Depending on weather, ventilation using 100% outside air will be used to exhaust contaminated air directly to the outside during installation of VOC emitting materials.

4. Housekeeping

- Provide regular cleaning concentrating on HVAC equipment and building spaces to remove contaminants from the building prior to occupancy.
- All coils, air filters, fans and ductwork shall remain clean during installation and, if required, will be cleaned prior to performing the testing, adjusting and balancing of the systems.
- Suppress and minimize dust with wetting agents or sweeping compounds. Utilize efficient and effective dust collecting methods such as a damp cloth, wet mop, or vacuum with particulate filters, or wet scrubber.
- Remove accumulations of water inside the building. Protect porous materials such as insulation and ceiling tile from exposure to moisture.
- Thoroughly clean all interior surfaces prior to replacing filters and running HVAC system for system balancing, commissioning and building flushout.
- Provide photographs of the above activities during construction to document compliance.

5. Scheduling and Construction Activity Sequence

- Schedule high pollution activities that utilize high VOC level products (including paints, sealers, insulation, adhesives, caulking and cleaners) to take place prior to installing highly absorbent materials (such as ceiling tiles, gypsum wall board, fabric furnishing, carpet and insulation, for example). These materials will act as 'sinks' for VOCs, odors and other contaminants, and release them later after occupancy.

PLANNING AND INSPECTION CHECKLISTS

The planning and inspection checklists included in this document are useful to ensure construction IAQ management is planned and implemented correctly. The planning checklist should be completed by the contractor prior to construction. The inspection checklists should be completed monthly to confirm the IAQ management plan is being followed. At the

time of inspection, photographs should be taken to support the checklist and to provide audit documentation for the USGBC.

University of Colorado Denver IAQ
February 14, 2009

Planning Checklist
(Must be completed weekly)

Project _____

Completed by: _____
(Name & Company)

Date: _____

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1. HVAC Protection

- ☐ MERV 13 filters at supply air intake
- ☐ MERV 8 filters at return air openings
- ☐ Seal supply diffusers and return air during demolition
- ☐ Seal supply diffusers and return air openings during construction
- ☐ Mechanical rooms clean and neat
- ☐ Periodic duct inspections during construction
- ☐ General Contractor to document with photographs

2. Source Control

- ☐ Low/no VOC products as indicated by specifications
- ☐ Restrict vehicle traffic volume and prohibit idling
- ☐ Utilize electric or natural gas alternatives for gasoline and diesel
- ☐ Cycle equipment off when not being used or needed
- ☐ Exhaust pollution sources to the outside
- ☐ Keep containers of wet products closed
- ☐ Cover or seal containers of waste materials
- ☐ Protect absorptive building materials from weather and moisture
- ☐ Prevent fume migration from construction vehicles and equipment into adjacent buildings
- ☐ General Contractor to document with photographs

3. Pathway Interruption

- ☐ Provide dust curtains or temporary enclosures
- ☐ Locate pollutant sources as far away as possible from supply dusts and areas occupied by workers
- ☐ General Contractor to document with photographs
- ☐ Isolate areas of work to prevent contamination of clean or occupied areas
- ☐ When using VOC emitting materials ventilate using 100% outside air

- ☐ General Contractor to document with photographs

4. Housekeeping

- ☐ Provide regular cleaning, including HVAC equipment
- ☐ If necessary clean HVAC equipment prior to testing, adjusting and balancing the systems
- ☐ Suppress and minimize dust with wetting agents or sweeping compounds
- ☐ Remove accumulations of water inside the building
- ☐ Protect porous materials
- ☐ General Contractor to document with photographs

5. Scheduling and Construction Activity Sequence

- ☐ Schedule high pollution activities prior to installing absorbent materials
- ☐ General Contractor to document with photographs

I confirm the checked activities to be proceeding according to the Construction Indoor Air Quality Plan. Items that are not checked will be addressed, initialed and dated once corrective actions have been taken. Items that are not applicable are labeled as such.

Signed: _____ Date: _____
(Contractor)

University of Colorado Denver IAQ
February 14, 2009

Inspection Checklist
(Must be completed weekly)

Project _____

Completed by: _____
(Name & Company)

Date: _____

---

1. HVAC Protection

- ☐ MERV 13 filters at supply air intake
- ☐ MERV 8 filters at return air openings
- ☐ Seal supply diffusers and return air during demolition
- ☐ Seal supply diffusers and return air openings during construction
- ☐ Mechanical rooms clean and neat
- ☐ Periodic duct inspections during construction
- ☐ General Contractor to document with photographs

2. Source Control

- ☐ Low/no VOC products as indicated by specifications
- ☐ Restrict vehicle traffic volume and prohibit idling
- ☐ Utilize electric or natural gas alternatives for gasoline and diesel
- ☐ Cycle equipment off when not being used or needed
- ☐ Exhaust pollution sources to the outside
- ☐ Keep containers of wet products closed
- ☐ Cover or seal containers of waste materials
- ☐ Protect absorptive building materials from weather and moisture
- ☐ General Contractor to document with photographs

3. Pathway Interruption

- ☐ Provide dust curtains or temporary enclosures
- ☐ Locate pollutant sources as far away as possible from supply dusts and areas occupied by workers
- ☐ General Contractor to document with photographs
- ☐ Isolate areas of work to prevent contamination of clean or occupied areas
- ☐ When using VOC emitting materials ventilate using 100% outside air
- ☐ General Contractor to document with photographs

4. Housekeeping

- ☐ Provide regular cleaning, including HVAC equipment
- ☐ If necessary clean HVAC equipment prior to testing, adjusting and balancing the systems
- ☐ Suppress and minimize dust with wetting agents or sweeping compounds
- ☐ Remove accumulations of water inside the building
- ☐ Protect porous materials
- ☐ General Contractor to document with photographs

5. Scheduling and Construction Activity Sequence

- ☐ Schedule high pollution activities prior to installing absorbent materials
- ☐ General Contractor to document with photographs

I confirm the checked activities to be proceeding according to the Construction Indoor Air Quality Plan. Items that are not checked will be addressed, initialed and dated once corrective actions have been taken. Items that are not applicable are labeled as such.

Signed: _____ Date: _____
(Contractor)

SECTION 01 35 96

SPECIAL PROCEDURES FOR PROPERTY PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Procedures for establishing existing conditions and monitoring procedures for protection of adjacent or nearby structures and improvements including, but not limited to, sidewalks, landscaping, parking facilities, roadways, or driveways, whether on or off the University's property arising from [**new foundations or excavations below adjacent or nearby buildings**].

1.2 UNIVERSITY'S SURVEY

A. University has obtained visual inspections of adjacent and nearby buildings together with photographic records showing details and conditions. This survey was made on **<Insert Date>** and the photographs are dated and certified by the photographer as of that date. One set of these data is available for Contractor's use and records.

1.3 SUBMITTALS

A. Submit photographs and survey data from same points as original, certified and dated by photographer and taken upon completion of [**underpinning existing foundations**] [**backfilling**]

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MONITORING

A. Establish accurate levels and positions of all elements relative to other fixed points to permit accurate monitoring of potential changes.

B. At all times during construction activities which are likely to affect adjacent properties, improvements or building, monitor conditions carefully including horizontal or vertical movements, changes in existing cracks, joints or defects or development of new cracks and other evidence of changing conditions. Report immediately to University's Project Manager and Architect/Engineer any changes to existing conditions and stop work where such appear to be significant or potentially dangerous to persons or property.

3.2 REMEDIES

A. Conduct construction operations and specifically [**excavation**] [**underpinning**] in a manner that will avoid damage to adjacent buildings, structures, properties or improvements. Promptly remedy any such damage whether to University's or other property and hold the University harmless from such damage.

3.3 POST-CONSTRUCTION SURVEY

A. Within 30 calendar days of completion of those construction activities that would potentially damage adjacent or nearby properties, re-survey all items of University's original survey and Contractor's supplemental information, including monitoring control points. Perform this work using a licensed surveyor and independent photographer. Identify specifically each changed condition, its magnitude and probable cause.

END OF SECTION 01 35 96

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect/Engineer, University, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

C. Related Requirements:

1. Section 01 42 00 "Reference" for list of references, standards and definitions.
2. Section 01 91 13 “General Commissioning” for coordination of testing with commissioning activities.
3. Division 23 for testing, adjusting and balancing of mechanical systems.
4. Division 26 for testing of electrical systems.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect/Engineer.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities

of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. As indicated in individual Specifications Sections or on the Drawings, the Work may include the following types of mockups:

    a. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
    b. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
    c. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

    1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect/Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect/Engineer for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: Where integrated exterior mockups are required and indicated on the Drawings, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect/Engineer.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect/Engineer.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For University's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

1. Monitor quality control over products, services, site conditions, and workmanship to produce work of specified quality.
2. Comply fully with manufacturers' instructions, including each step in sequence.
3. If manufacturers' instructions conflict with Contract Document requirements, request clarification from Architect/Engineer before proceeding.
4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
5. Perform work by persons qualified to produce workmanship of specified quality.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Subcontractor and Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance. In addition comply with the following:

1. For all trades: Proof of applicable licensing.
2. Electrical contractors:

    a. Company: State of Colorado master electrician license.
    b. On-site electricians: State of Colorado journeyman license.

3. Plumbing Contractors:

    a. Company: State of Colorado master plumbers license.
    b. On-site plumbers: State of Colorado journeyman license.
    c. Gas piping installations: State of Colorado master plumber with minimum 5 years institutional or heavy commercial gas piping experience. Provide an on-site supervisor with a minimum of 3 years of supervisory experience.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 or ASTM D 3740 as appropriate; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
3. Independent Agency: Meeting “Recommended Requirements for Independent Laboratory Qualifications” published by American Council for Independent Laboratories.
4. Authorized to operate in the State of Colorado.
5. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or of accepted values of natural physical constants.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. When required, build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. When required, build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups, as applicable; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect/Engineer, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect/Engineer.
2. Notify Architect/Engineer seven calendar days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect/Engineer's approval of mockups before starting work, fabrication, or construction.

a. Allow seven calendar days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: When indicated on Drawings, construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

M. Room Mockups: When indicated on Drawings, construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect/Engineer to evaluate quality of the Work. Provide room mockups of the following rooms:

N. Laboratory Mockups: When required by individual Specification Sections, comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.9 QUALITY CONTROL

A. University Responsibilities: Where quality-control services are indicated as University's responsibility, University will engage a qualified testing agency to perform these services.

1. University will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by the University.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to University are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ same entity engaged by University, unless agreed to in writing by University.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect/Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect/Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples including, but not limited to, safe storage and proper curing of concrete test cylinders at Project site for first 24 hours after casting as required by ASTM C 31.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Manufactured Items and Equipment: Where manufactured products or equipment are required to have representative samples tested, do not use such materials or equipment until tests have been made and the materials or equipment found to be acceptable. Do not incorporate in the work any product which becomes unfit for use after acceptance.

J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to University, Architect/Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: University will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of University, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.

2. Notifying Architect/Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect/Engineer with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections including instructions received from University. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect/Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.
5. Disposition: Pass, fail, nature of defects, if any.
6. Date and descriptions of remedial or correction action taken.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect/Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

3.3 SCHEDULE OF INSPECTIONS AND TESTS BY UNIVERSITY

A. University will engage testing agency and pay for testing and inspection associated with the following materials and systems, where included in the Project:

1. Compaction density of fill and backfill.

2. Drilled pier end bearing conditions and depths.
3. Cast-in-place concrete.
4. Precast concrete.
5. Post-tensioned concrete tendons.
6. Masonry.
7. Structural steel field welds and bolted connections.
8. Spray-applied fireproofing.
9. Built-up roof cutouts.
10. Asphaltic concrete paving.
11. Foundation drainage systems.
12. Drainage structures and piping.
13. Waterproofing.
14. Air barriers.
15. Fluid applied membranes.
16. Thermal imaging.
17. Curtain wall, window, and door field testing.
18. Ceiling hanger wire pull-out.
19. Electrical resistance of static-control resilient flooring.
20. Field sound testing of operable partitions.
21. Elevator safety.
22. Fan vibration.

END OF SECTION 01 40 00

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building Department Authority.
2. MS 4 Storm Water and Water Quality Permits
3. Applicable Codes and Standards.

1.3 BUILDING DEPARTMENT AUTHORITY

A. The University of Colorado Denver is charged with the responsibility of ensuring that provision of applicable codes, standards and guidelines are met on its campuses.

B. The University Denver campus has an established Building Authority responsible to review and examine buildings and plan documents, to permit and inspect construction and/or demolition to ensure conformance to codes adopted by the University and issue certificates of temporary occupancy and occupancy if satisfactory conformance is demonstrated.

C. The authority is executed by the Campus Building Official (CBO) who has the responsibility to perform all the duties set forth in the Current Approved State Buildings Codes and other applicable codes and standards indicated in the "Applicable Codes and Standards" Article of this Section.

D. Permits: Obtain a separate permit for each Project from the Office of the CBO prior to erecting, constructing, enlarging, repairing, moving, removing, converting or demolishing any building or portion thereof. Coordinate and obtain all permits through the University Project Manager. The Contractor is not responsible for costs associated with construction permits.

1. Exempt work: A building permit is not required for the following:

a. Fences less than or equal to 6 feet tall.
b. Movable casework, counters and partitions not over 5 feet 9 inches tall with no electrical or plumbing.
c. Platforms, walks, and driveways not more than 30 inches above grade and not over any basement or story below.
d. Painting, papering and similar finish work.
e. Other work of limited scope at the discretion of the CBO.

E. Permit Issuance: The CBO, or at the discretion of the CBO a third party code consultant, will review application, Drawings, Specifications, computations and other data filed for permit. Complete the permit

application with the University Project Manager. Permits require submittal of two (2) stamped, signed sets of Construction Documents, including Drawings, Specifications and all Addenda, and one (1) set of each engineering discipline's calculations, where such calculations are required. If CBO determines that submittal conforms to the requirements of the Building Code and other applicable codes, standards, laws, regulations and ordinances, an inspection record card will be issued with the building permit. Keep one stamped set of documents on site. The University will keep one stamped set in the Campus Support plan room.

F. Suspension or Revocation of Permit: CBO may, in writing, suspend or revoke a permit issued in error or on the basis of submitted information that is incorrect or that is in violation of the Building Code and other applicable codes and standards.

G. Posting of Permit: Post the Permit in a visible and protected location near the access to the project.

H. Inspection Record Card: Post the Inspection Record Card next to the permit in a visible and protected location near the access to the project. CBO will make required entries based on inspection of the work.

I. Inspection Requests:

1. Notify CBO that work is ready for inspection two business days before such inspection is desired by telephoning the number posted on the permit. The CBO retains the right to require requests in writing.
2. A re-inspection fee may be charged for prior rejected items.

J. Construction Inspections:

1. Contractor is not responsible for costs associated with construction inspections, except re-inspections. The CBO or his/her designee will perform all general building, electrical and plumbing inspections. All construction or work for which a permit is required must remain accessible and exposed for inspection purposes. Provide access to and means for inspection of work.

2. Site Utilities: Contact and comply with all requirements of City of Aurora.

3. Plumbing and Electrical Inspections: For new buildings and major additions, contact and comply with all requirements of State of Colorado Plumbing and Electrical Boards.

4. Provisions for structural and other special inspections required by Contract Documents, current approved State Building Codes and University Codes will be provided by the University.

K. Certification of Occupancy:

1. When CBO inspects the project and finds no violations of any provision of the Building Code, other applicable codes, standards, laws, regulations and ordinances, CBO will issue a Certification of Occupancy (CO) which will contain the following:

a. Building permit number.
b. Address of building.
c. Name and address of Owner.
d. Description of building or portion thereof for which certification is issued.
e. Statement that described building or portion thereof has been inspected for compliance with the requirements of the Building Code, other applicable codes, standards, laws, regulations and ordinances, as relates to type of occupancy and use for which the building is intended.

2. Temporary Certificate of Occupancy (TCO): If CBO finds no substantial hazard will result from occupancy of any building or portion thereof before the same is completed, CBO may issue a TCO for the use of a portion or portions of a building or structure prior to the completion of the entire building or structure.

3. Posting of CO: Provide a copy to the University Project Manager and post in a conspicuous location on the premises. CO may not be removed except by CBO upon initial occupancy.

4. Revocation of CO:

1.4 MS4 STORM WATER AND WATER QUALITY PERMITS

A. The University has a non-standard MS4 permit for entire Anschutz Medical Campus (AMC) that requires University over-sight of campus construction and its water quality impact. Contractors are required to prepare Storm Water Quality Plans and obtain State of Colorado CDPHE permits for all projects that impact site. In addition, Contractors shall comply with the University MS4 permit requirements, including keeping written record of weekly inspections of Storm Water Quality measures and attaching record to the weekly Progress Meeting minutes. Submit the plan, permits, and evidence of final closeout to University Project Manager who will copy all such storm water documents to University Engineering Department. Coordinate with University Project Manager who will arrange for University Grounds Manager to attend monthly inspections and closeout walk.

1.5 APPLICABLE CODES AND STANDARDS

A. The following approved building codes and standards have been adopted by State Buildings Programs (SBP) as the minimum requirements to be applied to all state-owned buildings and physical facilities including capital construction and controlled maintenance construction projects. Current applicable codes can be obtained from The Office of the State Architect's website.

B. University of Colorado Denver Codes and Standards: The following codes and standards supplement those indicated on the Office of the State Architect website.

1. The Manual of Guidelines and Standards for Construction Projects

   a. http://ucdenver.edu/about/departments/FacilitiesManagement/FacilitiesProjects/Pages/GuidelinesStandards.aspx

2. Colorado Rules and Regulations pertaining to Radiation Control, 6 CCR 1007 Part 1-20.
3. Colorado Rules and Regulations pertaining Air Quality Control Commission Regulations, 5 CCR 1001-10, Part B "Asbestos Control."
4. Colorado Rules and Regulations pertaining to Solid Waste, 6 CCR 1007-2.
5. Colorado Rules and Regulations pertaining to Hazardous Waste, 6 CCR 1007-3.
6. Federal Hazardous Waste Regulations, 40 CFR, Parts 260 through 264.
7. Federal Clean Water Act (CWA) is 33 U.S.C § 1251 et seq. (1972).
8. University of Colorado Denver | Anschutz Medical Campus, Asbestos Contaminated Soil Management, Standard Operating Procedure (SOP) Document.
9. NFPA 30: Flammable and Combustible Liquids Code.
10. NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals.
11. NFPA 72: National Fire Alarm and Signaling Code.
12. Life Safety Code (NFPA 101) – latest edition.

    a. Use the most restrictive interpretation where NFPA 101 conflicts with the IBC requirements.

13. ANSI/AIHA Z9.5 Laboratory Ventilation – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

14. ANSI/AIHA Z9.6 Exhaust Systems for Grinding, Buffing and Polishing – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

15. ANSI/AIHA Z9.10 Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

16. ANSI/ASHRAE/ASHE Standard 170 – Ventilation of Healthcare Facilities – latest edition.
17. ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality.
18. OSHA "Safety and Health Regulation for Construction" (29 CFR 1926).
19. OSHA "Occupational Safety and Health Standards" (29 CRF 1910).
20. American Institute of Architects, Academy of Architecture for Health (AIA AAHA) and Facility Guidelines Institute (FGI), Guidelines for Design and Construction of Hospital and Healthcare Facilities – latest edition (FOR PATIENT CARE AREAS ONLY).
21. CDC-NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL); latest edition.
22. NIH Design Requirements Manual (DRM) – latest edition.

    a. http://orf.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/DesignRequirementsManualPDF.htm

23. NIH Guidelines for Research Involving Recombinant DNA Molecules – latest edition.
24. ILAR Guide for Care and Use of Laboratory Animals - latest edition.
25. National Research Council of the National Academies, Institute for Laboratory Animal Research, Division on Earth and Life Studies: Guide for the Care and Use of Laboratory Animals - latest edition.
26. Uniform Federal Accessibility Standards (UFAS) – latest edition.
27. Metro Wastewater District's Rules and Regulations, (Sections 6.17 [6.13, 6.14] and 6.18).
28. City of Aurora Asphalt and Paving Standards - latest edition.

C. Other Standards: As indicated in individual Specification Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 41 00

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Definitions.
2. Industry Standards.
3. Abbreviations and Acronyms.

B. Related Requirements:

1. Section 01 10 00 “Summary” for an explanation of specification and drawing conventions.
2. Section 01 41 00 “Regulatory Requirements” for a list of applicable codes.

1.3 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

1. Definitions in this Section are not intended to be complete, exhaustive or exclusive. They are general and apply to the Work to the extent that such definitions are not stated more explicitly in other provisions of the Contract Documents.

B. "Approved": When used to convey Architect/Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract. Except where expressly indicated, such approval does not release the Contractor from responsibility to fulfill requirements of the Contract Documents.

C. “Backup”: N+1 system.

D. "Directed": A command or instruction by Architect/Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

E. “EHS”: Environmental Health and Safety.

F. “Engineer”: Architect/Engineer. Other terms including “Mechanical Engineer”, “Electrical Engineer”, or “Structural Engineer” have the same meaning as “Engineer.”

G. “General Conditions”: Contract terms contained in [**Contractor’s Agreement Design/Bid/Build, State Form SC-6.21 and The General Conditions of the Construction Contract Design/Bid/Build, State**

Form SC-6.23] "General Requirements": Provisions and requirements of all Division 01 Sections as they apply to all aspects of the Work.

H. "Guarantee": The narrow definition of the term "warranty" applying to both "warranty" and "guarantee" which terms are used interchangeably.

I. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

J. "Redundant": 2N system. The level of redundancy is determined by design.

K. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

L. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

M. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

N. "Owner": Principal Representative and/or University.

O. "Provide": Furnish and install, complete and ready for the intended use.

P. "Project Manual": Bound, printed volume or volumes including Conditions of the Contract and Specifications, which may also include bidding requirements, contract forms, details, schedules, surveys, reports or other relevant items that may or may not be Contract Documents.

Q. "Project Site": Space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

R. "Supplementary Conditions": University Special Supplementary General Conditions. Other terms including "Supplementary General Conditions" shall have the same meaning.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

1. Referenced standards take precedence over standards that are not referenced but generally recognized in the construction industry as applicable.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents.

1. Updated Codes and Standards: Where an applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected, submit Contractor-Initiated Change Order Bulletin and Change Order Proposal in accordance with

Section 01 26 00 "Contract Modification Procedures" for consideration to modify contract requirements to comply with revised code or standard.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
2. Where required by individual Specification Sections provide and maintain copies of referenced codes and standards at Project Site.
3. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Architect/Engineer reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

D. Unreferenced Standards: Unreferenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.

E. Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.

1.5 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AABC	Associated Air Balance Council www.aabc.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.americanbearings.org	(202) 367-1155
ACI	American Concrete Institute (Formerly: ACI International) www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The)	(205) 257-2530

	www.aeic.org	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The) www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(607) 256-3313
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)	
ARI	American Refrigeration Institute (See AHRI)	
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917

ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers (The) www.asse.org	(847) 699-2929
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWEA	American Wind Energy Association www.awea.org	(202) 383-2500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWMAC	Architectural Woodwork Manufacturers Association of Canada www.awmac.com	(403) 453-7387
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.gobrick.com	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991

BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BOCA	BOCA (Building Officials and Code Administrators International Inc.) (See ICC)	
BWF	Badminton World Federation (Formerly: International Badminton Federation) www.bwfbadminton.org	60 3 9283 7155
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.electricity.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFSEI	Cold-Formed Steel Engineers Institute www.cfsei.org	(866) 465-4732 (202) 263-4488
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(404) 622-0073
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.org	(706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(800) 328-6306 (847) 517-1200

CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
CWC	Composite Wood Council (See CPA)	
DASMA	Door and Access Systems Manufacturers Association www.dasma.com	(216) 241-7333
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electronic Components Association www.ec-central.org	(703) 907-8024
ECAMA	Electronic Components Assemblies & Materials Association (See ECA)	
EIA	Electronic Industries Alliance (See TIA)	
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (703) 538-1616
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ESTA	Entertainment Services and Technology Association (See PLASA)	
EVO	Efficiency Valuation Organization www.evo-world.org	(415) 367-3643 44 20 88 167 857
FIBA	Fédération Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00

FIVB	Fédération Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 45
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council U.S. www.fscus.org	(612) 353-4511
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association (See AHRI)	
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(415) 536-0288
IAS	International Approval Services (See CSA)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (202) 370-1800

ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICPA	International Cast Polymer Alliance www.icpa-hq.org	(703) 525-0511
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America) www.ies.org	(212) 248-5000
IESNA	Illuminating Engineering Society of North America (See IES)	
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 981-0100
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
IGSHPA	International Ground Source Heat Pump Association www.igshpa.okstate.edu	(405) 744-5175
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
Intertek	Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA) www.intertek.com	(800) 967-5352
ISA	International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society) www.isa.org	(919) 549-8411
ISAS	Instrumentation, Systems, and Automation Society (The) (See ISA)	
ISFA	International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association) www.isfanow.org	(877) 464-7732 (801) 341-7360
ISO	International Organization for Standardization www.iso.org	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association (See ISFA)	

ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (See CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association) www.wmmpa.com	(800) 550-7889 (530) 661-9591
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.org	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848

NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFPA	NFPA International (See NFPA)	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.nhla.com	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association (See NWFA)	
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010

NSPE	National Society of Professional Engineers www.nspe.org	(703) 684-2800
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PLASA	PLASA (Formerly: ESTA - Entertainment Services and Technology Association) www.plasa.org	(212) 244-1505
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International (Society of Automotive Engineers) www.sae.org	(877) 606-7323 (724) 776-4841
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	

SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 293-1995
SMA	Screen Manufacturers Association www.smainfo.org	(773) 636-0672
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SRCC	Solar Rating and Certification Corporation www.solar-rating.org	(321) 638-1537
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. (Formerly: Tile Council of America) www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association, Inc. www.tema.org	(914) 332-0040
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance) www.tiaonline.org	(703) 907-7700

TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance (See TIA)	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UBC	Uniform Building Code (See ICC)	
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association (See MMPA)	
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 938-5441

WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut für Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, LLC www.icc-es.org	(800) 423-6587 (562) 699-0543

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce National Institute of Standards and Technology www.nist.gov	(301) 975-4040
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-2664
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FG	Federal Government Publications www.gpo.gov	(202) 512-1800
GSA	General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112

LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division http://eetd.lbl.gov	(510) 486-4000
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742
SD	Department of State www.state.gov	(202) 647-4000
TRB	Transportation Research Board National Cooperative Highway Research Program www.trb.org	(202) 334-2934
USDA	Department of Agriculture Agriculture Research Service U.S. Salinity Laboratory www.ars.usda.gov	(202) 720-3656
USDA	Department of Agriculture Rural Utilities Service www.usda.gov	(202) 720-2791
USDJ	Department of Justice Office of Justice Programs National Institute of Justice www.ojp.usdoj.gov	(202) 307-0703
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772 (301) 881-0666
USPS	United States Postal Service www.usps.com	(202) 268-2000

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CFR	Code of Federal Regulations Available from Government Printing Office www.gpo.gov/fdsys	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664

	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
	Available from Defense Standardization Program www.dsp.dla.mil	
	Available from General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
	Available from National Institute of Building Sciences/Whole Building Design Guide www.wbdg.org/ccb	(202) 289-7800
MILSPEC	Military Specification and Standards (See DOD)	
USAB	United States Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
USATBCB	U.S. Architectural & Transportation Barriers Compliance Board (See USAB)	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as an indication by Architect/Engineer that such temporary activity is not required for successful completion of the Work. The use of alternative facilities equivalent to those specified is the Contractor's option, subject to Architect/Engineer's and University acceptance.

B. Related Requirements:

1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 01 35 46 “Indoor Air Quality” for temporary facility work including HVAC, air filtration, moisture management, air filtration and dust control partitions required to comply with indoor air quality requirements during construction.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.4 QUALITY ASSURANCE

A. General: Comply with governing regulations and utility company regulations and recommendations for the construction of temporary facilities including, but not necessarily limited to, code compliances, permits, inspections, testing, health, safety, pollution and environmental compliances.

B. Fire-safety: Comply with NFPA 421 “Standard for Safeguarding Construction, Alteration, and Demolition Operations.”

C. Safety: Comply with ANSI/ASSE A10 “Construction Package” series of safety construction standards.

D. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

E. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

F. Accessible Temporary Egress: Where temporary accessible egress from existing buildings or portions thereof is provided, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before University's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide both new or used materials and equipment for temporary facilities, which are in substantially undamaged and serviceable condition. Provide types and qualities which are recognized in the construction industry as suitable for the intended use in each application. Comply with Utility Company requirements as applicable.

2.2 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.
2. Comply with Section 01 10 00 “Summary” for use of site for staging areas.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Digital Camera: Minimum 12 megapixel; available in field office for use.

C. Thermometer: Outdoor, re-settable type indicating daily maximum and minimum temperatures.

1. Locate in a shaded-from-the-sun, conveniently readable location that will give reasonably accurate readings of the actual air temperature and be reached easily for resetting.
2. Maintain daily log of reading.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate, expand and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Use qualified workers for the installation of temporary facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, University, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Comply with requirements in Section 01 10 00 “Summary” for existing utility disruption procedures.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction. Where available, connect to University's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to University. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Obtain and pay for all required water taps.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of University's existing toilet facilities is not permitted.

2. Provide temporary toilets within available site area in location approved by University which will best serve the needs of construction personnel.
3. Supply and maintain toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each sanitary facility, and provide appropriate waste paper containers for used materials.
4. At Contractor's option, provide drinking water for construction personnel by either water-system-connected drinking fountains or by containerized tap dispensers with paper cups (or both).

E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. HVAC Equipment: Unless University authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
b. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
c. Permanent HVAC System: If University authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air and exhaust grille in system and remove at end of construction. Clean and adjust HVAC system and put in new condition before Completion as required in Section 01 77 00 "Closeout Procedures".

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Provide weatherproof, grounded, electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Include, as required, transformers, overload protected disconnects, automatic ground fault interrupters and main distribution switchgear. Maintain equipment in a condition acceptable to University.

1. Install electric power service overhead unless otherwise indicated.
2. Where available capacity exists in existing system, connect temporary service to University's existing power source, as directed by University.
3. Provide separate connection for power and for lighting.
4. Provide sufficient 220v outlets for special tools, welding equipment and similar devices requiring such service at locations where required.
5. Provide sufficient circuits and duplex 120v single phase outlets so located that any part of the work can be reached with a 75 foot extension cord to accommodate normal power tools and supplemental lighting.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Provide temporary light to levels and as required by governing regulations but not less than minimum 5 foot-candle illumination in all areas accessible to workers during hours they are at the job; minimum 10 foot-candles for shop areas; 20 foot-candles or more where detailed or finishing work is being done, supplemented as may be required.
2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
3. Install lighting for Project identification sign.
4. Where permanent light fixtures have been used for temporary lighting, supply temporary lamps and replace with new lamps at time of Completion.
5. Provide lighting in stairways and exits at all times.

J. Telephone Service: Provide temporary telephone service in Contractor’s field office and distribute to each work station.

1. Pay for line installation, monthly charges, and expenses necessary to extend service from minimum point of presence (MPOP) as determined by University I/S.
2. Provide temporary telephone service in common-use facilities for use by all construction personnel.
3. Provide answering machine and a dedicated telephone line for a facsimile machine.
4. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect/Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to University.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Surface temporary access road with road base material of not less than 4 inch thickness and compact.
2. Provide temporary signage and temporary pedestrian accessways or other special considerations necessary for continued University operations.
3. Provide stop sign(s) at all points of egress from construction site to meet standards established in the Manual of Uniform Traffic Code Devices (MUTCD).
4. Maintain University access to areas affected by temporary access roads during inclement weather.
5. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
6. Restore to original condition to satisfaction of University when no longer required.

C. Temporary Walks: Construct and maintain temporary walks around the construction work and to offices, toilets and similar locations on the site.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Comply with requirements in Section 01 10 00 “Summary.”

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs at locations indicated or directed. Unauthorized signs are not permitted.

1. Identification Signs: Unless otherwise indicated, provide 4 foot by 8 foot Project identification sign.

   a. Architect/Engineer will provide sign layout, including colors and graphics as approved by University Resident Architect through University Project Manager.

2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

   a. Provide temporary, directional signs for construction personnel and visitors.

3. Engage an experience sign painter to apply required colors and graphics in a neat and professional manner.
4. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."

1. Coordinate with University Project Manager to obtain approval from University Environmental Services Manager.
2. Provide waste chutes as required in accordance with applicable laws and regulations.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel. The selection of type, size and number of hoisting facilities is the solely the responsibility of the Contractor.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Temporary Elevator Use: Use of elevators is not permitted without prior written approval of the Architect/Engineer and University Project Manager.

1. If so approved, only one designated elevator may be used subject to the requirements of “Existing Elevator Use” paragraph below.

K. Existing Elevator Use: When approved by University, one designated existing elevator may be used at no charge to Contractor or other subcontractors for transporting personnel, small tools, materials, and equipment. Comply with requirements of Section 01 10 00 “Summary” and the following:

1. Contractor will not be granted exclusive use of the designated elevator. University personnel and staff will be permitted to use this elevator as their work duties require.
2. Entire car is lined (floor, walls, ceiling) with 3/4 inch Fir plywood or equivalent.
3. Total load carried does not exceed rated capacity of elevator.
4. No materials, equipment, trash, tools or other items too large to be readily moved into and out of the car may be carried in the elevator.
5. Before acceptance of the building, linings are removed; all exposed surfaces are in new condition; all controls, relays, other parts showing any wear have been replaced.
6. Entire elevator, including machinery, electrical components, doors, operators and controls shall be tested, adjusted, and put in new condition with specified warranties and maintenance to take effect at date of Completion Certificate.
7. Written clearance has been obtained from the Elevator Service Company stating that the installation is safe and complete for this use prior to using it.
8. The Contractor signs the Elevator Service Company's standard agreement and release forms for this usage and pays charges for maintenance, service, repairs, and reconditioning.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of University's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to University. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Protection of Work: Protect in-progress and completed work from damage or deterioration, other than normal weathering of exposed materials, through construction duration until completion, as appropriate and as recommended by manufacturer and Installer.

1. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
2. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.
3. Always protect excavation, trenches, and building, from damage from rain water, spring water, ground water, backing up of drains or sewers. Provide pumps, equipment, enclosures, to provide this protection.
4. Remove protective coverings and materials at the appropriate time but no later than final cleaning operations.

C. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 10 00 "Summary."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Comply with Section 01 41 00 “Regulatory Requirements” Article “MS4 Storm Water and Water Quality Permits.”
2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
3. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
4. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
5. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with Section 01 41 00 “Regulatory Requirements” Article “MS4 Storm Water and Water Quality Permits.”

F. Tree and Plant Protection: Install temporary fencing or guard located outside the drip line of trees to protect vegetation from damage arising out of construction operations, including cutting, breaking or skinning of roots and skinning or bruising of bark. Protect tree root systems from damage, flooding, and erosion.

1. Do not stockpile construction materials or excavated materials inside dripline.
2. University will identify historically recorded trees and vegetation not to be disturbed.
3. Water trees and other vegetation to remain as required to maintain their health for the duration of the Project.
4. Repair or replace trees and vegetation damaged by construction operations in a manner acceptable to Architect/Engineer. Use a qualified tree surgeon to perform the work.

G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

H. Site Enclosure Fence: Within 10 business days of mobilization, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates and will protect adjacent sites from damage or contamination..

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide bases for supporting posts.
3. Locate so base supports do not extend outside work area where adjacent to walkways.
4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to University.

I. Security: Provide security program and facilities to protect the Work, existing facilities, and University operations and to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Coordinate with University Police.
2. Provide lockable entrances and lock entrances at end of each work day.
3. After review and approval by University, install temporary enclosure around partially completed areas of construction.
4. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting wherever required to prevent accidents and losses.

K. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

L. Covered Walkway: Where regulations require or where a public roadway/walkway adjoins the Project site and materials may be hoisted across the walkway, erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct covered walkways using scaffold or shoring framing.
2. Provide overhead waterproof decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Paint and maintain appearance of walkway for duration of the Work in a manner acceptable to the Architect/Engineer and University.
4. Extend back wall beyond structure to complete the enclosure fence.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
2. Coordinate temporary enclosures with ventilating and drying-of-the-work requirements, so as to avoid dangerous conditions and deleterious effects.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

N. Temporary Partitions: Provide floor-to-floor or floor-to-ceiling dustproof partitions terminating in dustproof floor or ceiling above to limit dust and dirt migration and to separate existing active elevator hoistways and other areas occupied by University from dust, fumes and noise in compliance with Section 01 35 46 "Indoor Air Quality" and the following:

1. Construct dustproof partitions with 5/8 inch gypsum wallboard with joints taped on occupied side, and 1/2 inch fire-retardant-treated plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.
7. At elevator hoistway entrances not used during construction, seal openings with plastic sheet and duct tape.

O. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Fire Extinguishers: Minimum one per floor at or near useable exit.

   a. Provide additional extinguishers where convenient and effective for intended purpose.
   b. Comply with NFPA 10 to the extent applicable.

2. Strictly enforce site prohibition against smoking.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
4. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Coordinate with University Project Manager to review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
5. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes for fighting fires.
7. Store combustible materials in containers in fire-safe locations.
8. Permanent Fire Protection System: Complete and make operational at earliest possible date. Instruct site personnel on use of permanent system.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Comply with requirements in Section 01 35 46 "Indoor Air Quality Procedures."

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

1. Do not permit temporary offices and similar temporary or permanent spaces to be used as living quarters or for other unintended occupancies or uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Janitorial Services: Provide daily janitorial services for temporary offices, toilets, and similar areas at the project site. Require users of other temporary facilities to maintain clean and orderly premises.

D. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

E. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

F. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion, unless Architect/Engineer requests that it be retained for a longer period of time. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. University reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 01 21 00 "Allowances" for products selected under an allowance, if applicable.
2. Section 01 23 00 "Alternates" for products selected under an alternate, if applicable.
3. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
4. Section 01 42 00 "References" for applicable industry standards for products specified.
5. Section 01 77 00 “Closeout Procedures” for submittal of project warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Requests for consideration of comparable products will only be entertained during bidding.
2. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
3. Architect/Engineer's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation of a comparable product request. Architect/Engineer will notify Contractor of approval or rejection of proposed comparable product.

a. Form of Approval: Written Addendum.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.

B. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturers or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.

D. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.

E. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.

1. Name of product and manufacturer.
2. Model and serial number.
3. Capacity.
4. Speed.
5. Ratings.
6. Power characteristics (if applicable).
7. UL label or compliance (if applicable).

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents. Such disclaimers and limitations do not relieve warranty requirements on Work that incorporates product nor do they relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to University.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for University.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time and Form: Comply with requirements in Section 01 77 00 "Closeout Procedures."

D. Warranty Requirements:

1. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the University has benefited from use of the Work through a portion of its anticipated useful service life.
4. University's Recourse:

    a. Written warranties made to the University are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the University can enforce such other duties, obligations, rights, or remedies.
    b. Rejection of Warranties: The University reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
    c. The University reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged, are asbestos free, and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. University reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect/Engineer will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product and provide only products previously approved during bid phase by written Addendum. The determination of equivalence is at the sole discretion of the Architect/Engineer who has no obligation to prove non-equivalence.
7. Mechanical and electrical equipment design and their space requirements are based on the first named item of the Section in which specified or that scheduled on the Drawings. If other than the first named or scheduled item listed for use is selected, modification to other elements of Work may be required. Show all such modification on shop drawings and submittals as appropriate. The cost of such modifications is solely the responsibility of the Contractor.

8. Where manufacturers are listed as acceptable for specific proprietary products but precise identification by model, series, or trade name is not specified, submit detailed product information for such products for Architect/Engineer's acceptance prior to ordering. Include specific requirements for modifications to other construction, including but not limited to, power and utility requirements, characteristics, capacities, size and locations. The cost of such modifications is solely the responsibility of the Contractor.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. If proposing a comparable product by another manufacturer, whether named or not, provide a custom product if manufacturer’s standard product does not include salient features of the Basis-of-Design product indicated. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
6. Contractor’s Option: Where materials, products, systems or methods are specified to be selected from a list of options, subject to compliance with requirements, the choice of which material, method, product or system will be solely at the Contractor’s discretions. There will be no change in Contract Sum or Time because of such choice.

C. Visual Matching Specification: Where Specifications require "match Architect/Engineer's sample", provide a product that complies with requirements and matches Architect/Engineer's sample. Architect/Engineer's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect/Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect/Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Prior to bid, Architect/Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer will reject request:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of University-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 01 10 00 "Summary" for limits on use of Project site and procedures related to utility interruptions.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor or professional engineer.

B. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan and Request: Submit plan and request describing procedures at least 21 calendar days prior to the time cutting and patching will be performed.

1. Submit request whenever cutting and patching operation affect:

a. Work of the University or any separate contractor.
b. Structural value or integrity of any element of the Project.
c. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
d. Efficiency, operational life, maintenance or safety of operational elements.
e. Visual qualities of sight-exposed elements.
f. Cutting new openings in existing structural concrete walls, floors and suspended slabs.
g. Cutting new openings in existing roofs and roofing materials.
h. Cutting exterior walls.
i. Cutting into shafts.

2. Include the following information:

a. Extent: Describe reason for and extent of each occurrence of cutting and patching, including explanation of why cutting and patching operation cannot be reasonable avoided.
b. Changes to In-Place Construction: Describe cutting and patching methods and anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
c. Products: List products to be used for patching and firms or entities that will perform patching work.
d. Trades: Indicate trades and subcontractors who will perform the work.
e. Dates: Indicate when cutting and patching will be performed.
f. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

1) Include description of provisions for temporary services and systems during interruption of permanent services and systems.
2) Comply with requirements of Section 01 10 00 "Summary" related to existing utility and system interruptions.

g. Structural Elements: Where cutting and patching structural elements requires the addition of reinforcement, submit details and calculations signed and sealed by an Engineer registered in the State of Colorado. Indicate how new reinforcing will be integrated with original structure.

3. Limitations: Approval of cutting and patching request does not waive right of Architect/Engineer or University to later require complete removal and replacement of work found to be unsatisfactorily cut and patched.

D. Certified Surveys: Submit two copies signed by land surveyor or professional engineer.

E. Final Property Survey: Submit one electronic and two paper copies showing the Work performed and record survey data.

1. Include certified statement that lines and levels of the work comply with the requirements of the Contract Documents and listing authorized or accepted deviations, cross-referenced to Change Order number, where applicable.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect/Engineer of locations and details of cutting and await directions from Architect/Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to the following:

   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Mechanical systems piping and ducts.
   f. Control systems.
   g. Communication systems.
   h. Fire-detection and -alarm systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.
   f. Piping, ductwork, vessels, and equipment.
   g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction exposed to the exterior or exposed in occupied spaces in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect/Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

5. Hazardous Materials: Do not proceed with cutting and patching operations until University has examined existing construction for the presence of asbestos and/or lead-based coatings. Comply with requirements in Section 01 35 00 “Special Procedures.”

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Division 01 Section "Sustainable Design Requirements."

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect/Engineer for the visual and functional performance of in-place materials.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work. Notify University Project Manager and Architect/Engineer and obtain approval prior to disturbing, moving or penetrating soil.

1. Arrange for locating buried utilities including water and sewer lines within construction limits. Obtain location information and stake all known utilities prior to commencing construction activities.

a. Contact Utility Notification Center of Colorado (UNCC), 1-800-922-1987, and comply with UNCC guidelines.

2. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
3. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility or University, as appropriate, that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect/Engineer according to requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect/Engineer promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect/Engineer when deviations from required lines and levels exceed allowable tolerances. Record deviation which are accepted (i.e., not corrected) on record drawings in accordance with the requirements of Section 01 78 39 “Project Record Docuements.”
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect/Engineer.

3.4 FIELD ENGINEERING

A. Identification: University will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect/Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect/Engineer before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor or professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated to the extent they are more explicit or stringent than requirements of the Contract Documents.

C. Install products at the time and under conditions, including weather that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Isolate each part of complete installation from incompatible material as needed to prevent deterioration.

E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned, true and level as applicable, with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect/Engineer.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. Attachment to Concrete:

1. No drilled inserts or powder-actuated fasteners are permitted in pre-stressed concrete except as specifically authorized by Contractor and carried out under the direct supervision of its Superintendent.
2. Only those devices with a maximum controlled penetration of 3/4 inch or less will be permitted. Make holes through slabs by means of sleeves placed no closer than 2 inch from tensioning cables. Core drilling will not be permitted unless unavoidable and as specified for cutting and patching in this Section.

K. Joints: Unless indicated otherwise, make joints of uniform width. Where joint locations in exposed work are required but not indicated, arrange joints for the best visual effect. Confirm arrangement with Architect/Engineer before proceeding. Fit exposed connections together to form hairline joints.

L. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Responsibility: Provide cutting and patching work, including attendant excavation and backfill required to complete the Work or to:

1. Make components fit together properly.
2. Uncover portions of the Work to provide for installation of ill-timed work.
3. Remove and replace defective work or work not conforming to requirements of Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

D. Temporary Support: Provide temporary support of work to be cut.

E. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

F. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

G. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations. Employ methods which will prevent settlement or damage to other work.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements, including tolerance, specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

J. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 UNIVERSITY-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for University's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by University's construction personnel.

1. Construction Schedule: Inform University of Contractor's preferred construction schedule for University's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify University if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include University's construction personnel at preinstallation conferences covering portions of the Work that are to receive University's work. Attend preinstallation conferences conducted by University's construction personnel if portions of the Work depend on University's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven calendar days during normal weather or three calendar days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

   a. Use containers intended for holding waste materials of type to be stored.

B. Collection Point: Review location with University and obtain approval.

C. Site: Maintain Project site free of waste materials and debris.

D. Wind Blown Debris: Prevent spread of trash, debris, cartons, packing material, or other waste on or off Project site by wind.

E. Dust: Sprinkle dusty debris with water.

F. Packing Materials: Immediately after uncrating or unpacking materials or equipment, remove all crating, lumber, excelsior, wrapping or other like combustible materials from building to central collection facility.

G. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

H. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

I. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

J. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

K. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

L. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

M. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

N. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

O. Snow and Ice: Remove snow and ice from sidewalks adjacent to site and from access ways to building and construction site.

P. Streets: At frequency required by University and/or governing authority, clean adjacent and nearby streets of dirt resulting from construction operations.

3.9 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.

10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Misalignment.
25. Excessive weathering.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft.
29. Vandalism.

END OF SECTION 01 73 00

SECTION 01 77 00

CLOSEOUT PROCEDURES

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures, including Notice of Completion and Final Inspection procedures.
2. Occupancy procedures, including Notice of Approval of Occupancy/Use and University Supplemental Notice of Occupancy and Use List.
3. Final Acceptance procedures, including Pre-Acceptance Checklist and University Supplemental Building/Project Acceptance List.
4. Inspections after completion.
5. Warranties.
6. Final cleaning.
7. Repair of the Work.

B. Related Requirements:

1. Section 01 32 33 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 01 73 00 "Execution" for progress cleaning of Project site.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Section 01 79 00 "Demonstration and Training" for requirements for instructing University's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Notice of Completion.

C. Certified List of Incomplete Items: Final submittal at Final Acceptance.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 NOTICE OF COMPLETION AND SUBSTANTIAL COMPLETION PROCEDURES

A. Procedures and Submittals Prior to Notice of Completion: Complete and submit all of the following items prior to submitting Notice of Completion to Architect/Engineer. Include Contractor's comprehensive list of items to be completed, corrected or not in compliance with the Drawings and Specifications.

1. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's preliminary punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
2. Building Inspection Record: Submit completed record with all required corrections noted.
3. Certificate of Occupancy: Submit Certificate of Occupancy (CO) or Temporary Certificate of Occupancy (TCO).
4. Final Completion Schedule: Submit schedule for performing and completing all work indicated on the Contractor' list of incomplete items.
5. Submit sustainable design documentation.
6. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
7. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
8. Submit test/adjust/balance records.

B. Final Inspection: Submit Notice of Completion to Architect/Engineer. Upon receipt, Architect/Engineer and University will review and if all items on the University Supplemental Notice of Completion Checklist are complete will, within the timeframe required by the Contract, schedule and make an inspection of the Project to determine whether the Work is substantially complete.

1. Final Punch List: Based on the inspection, Architect/Engineer will prepare a final punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work for any reason.
2. Re-inspection: If the cumulative number of items identified on the final punch list prevents a determination that the work is substantially complete, complete those items and when complete resubmit Notice of Completion. Upon receipt of resubmittal, Architect/Engineer and University will then schedule and make a re-inspection of the Project to determine whether the Work is substantially complete.

C. Notice of Substantial Completion: When inspection of the Work indicates that the Project is substantially complete and all other Contract provisions required for substantial completion have been satisfied, Architect/Engineer will issue a Notice of Substantial Completion (State Form SBP-07).

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor or as approved by Architect/Engineer.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect/Engineer.
d. Name of Contractor.
e. Page number.

4. Submit list of incomplete items in the following format:

a. MS Excel and PDF electronic file. Architect/Engineer will return annotated file.

1.8 OCCUPANCY PROCEDURES

A. Procedures and Submittals Prior to Occupancy: Complete and submit all items on both State Form SBP-01 “Notice of Approval of Occupancy/Use” and University Supplemental Notice of Occupancy and Use List.

1.9 FINAL ACCEPTANCE PROCEDURES

A. Procedures and Submittals Prior to Final Acceptance: Complete and submit all items on both State Form SBP-05 “Pre-Acceptance Checklist” and University Supplemental Building/Project Acceptance List.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 business days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.10 SETTLEMENT AND FINAL PAYMENT

A. Submit and complete all of the following as a condition precedent to settlement and final payment:

1. All guarantees and warranties.
2. All statement to support local sales tax refunds, if any.
3. Three (3) sets of operation and maintenance manuals.
4. One (1) set of as-built Contract Documents showing all job changes.
5. All demonstration and training completed in accordance with Section 01 79 00.

6. All punch list items documented as complete.

B. Final Certificate of Payment: Submit in accordance with the requirements of Section 01 29 00 "Payment Procedures."

1.11 INSPECTIONS AFTER COMPLETION

A. Warranty/Guarantee Inspections: During the warranty period, accompany Architect/Engineer and University Representative, and participate in inspection(s) of the Project to identify defective and deficient work at intervals and as required by the Contract.

B. List of Deficient or Defective Work: Within 10 business days of inspection, Architect/Engineer will provide Contractor with a list of items requiring correction.

C. Remedial Work: Upon receive of itemized list, immediately correct and remedy deficiencies and defects in a manner satisfactory to the Architect/Engineer and University.

1.12 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties to the Architect/Engineer prior to advertisement of the Notice of Contractor's Settlement. If the Notice of Acceptance designates a commencement date for warranties other than the date of Notice of Acceptance for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

B. Partial Occupancy: When a designated portion of the Work is completed and occupied or used by the University, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect/Engineer within fifteen (15) calendar days of completion of that designated portion of the Work.

C. Special Warranties: When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the University through the Architect/Engineer for approval prior to final execution. Refer to individual Specification Sections for specific requirements for special warranties.

D. Form of Submittal: Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Number of Copies: Two.
2. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
3. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
5. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

F. List of Extended Warranties: Provide a comprehensive list of all manufacturers' standard and special warranties with duration greater than one year after Notice of Acceptance. Organize list into an orderly sequence based on table of contents of the Project Manual.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
2. Do not use sweeping compounds on concrete floors that will leave residue affecting finish floor materials.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations immediately prior to Occupancy for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior finishes to a dirt-free condition, free of grease, dust, stains, films, fingerprints, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Power scrub and power buff resilient flooring surfaces, tile and fluid-applied flooring.
k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

l. Remove labels that are not permanent.
m. Wipe surfaces of mechanical and electrical equipment, elevator equipment where applicable, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
r. Clean food service equipment to sanitary condition acceptable for intended food service use and approved by authority having jurisdiction.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.3 ATTACHMENTS

A. Samples of the following forms are appended to this Section for reference following End of Section 01 77 00:

1. University of Colorado Denver | Anschutz Medical Campus Supplemental Notice of Occupancy and Use List.

2. University of Colorado Denver | Anschutz Medical Campus Supplemental Building / Project Acceptance List.

END OF SECTION 01 77 00

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Notice of Occupancy and Use List

Project Name & Number: _____

Contractor: _____

In addition to completing Notice of Approval of Occupancy / Use (SBP-01), the following items must be completed before Occupancy is approved.

Activity	Date Completed	Remarks
1. Final and formal address posted on the building entries.		
2. A copy of the Contractor's in-progress red line "as-built" drawings has been given to BMO representative & a 2nd copy is provided for Projects plan room. This is to include landscape drawings showing irrigation installation.		
3. Maintenance, operations and spare parts manuals on all installed equipment.		
4. Notice of Partial Substantial Completion concerning roles/ responsibilities of University and Contractor for security, maintenance, heat, utilities reviewed and accepted.		
5. Manufacturer maintenance, operations and spare parts manuals for fixtures, mechanical, electrical and plumbing.		
6. Hardware maintenance, operations and spare parts manuals for doors & locks, including roll up doors.		
7. Warranty Dates and Contact list for all Contractors and Suppliers given to BMO.		
8. Transfer utility account from Contractor to Facilities Operations.		
9. Site plan to include first floor main isolation locations and plans for each floor to include main utility shutoffs, for utilities to include water, electrical, steam, sewer, fuel supply, telecom, fiber optic and gasses, identified on a set of drawings.		
10. If Commissioning Report is completed, BMO has reviewed/ commented, including electrical, plumbing, mechanical/ HVAC.		
11. All Contractor provided equipment has new filters & construction filters removed.		
12. Not Used		
13. Elevator equipment rooms insulated and space conditioned for control system requirements.		
14. Testing Certifications provided to BMO for Elevators, Fire Systems & Annunciator Systems.		
15. FSS has been provided with copy of Building Department testing and inspection report for window washing equipment.		
16. Roof walking pads to access equipment are installed.		
17. PM to communicate to fire department via Life Safety Officer that building has transitioned to BMO. Alarms at Anschutz Medical Campus report to University Police Dispatch and at Downtown report to designated monitoring company.		

18. BAS System (Siemens), Energy and Lighting, Fuel Systems, and Power Management must report remotely & verify with University - Engineering.		
19. Training for BMO and FSS on installed equipment and systems is completed.		
20. Equipment keys and locks transitioned to Operations, including fire panels, electrical panels, directories and generator panels. Construction cores removed and replaced with permanent cores.		
21. Access control pathways and junction boxes for installed doors, gates, loading docks and roof access complete. ***All wiring and hardware completed and electronic security access controls in place and tested by University Electronic Security.**		
22. EH&S is provided, as applicable for project, with fume hood certification, water testing certification, hazardous waste compliance certification, radiation compliance certification, BSL3 certification, and all other specialty equipment certification.		
23. PM notifies University Risk Management that project is transferring to University and notifies Contractor that it can eliminate Builders Risk Insurance.		
24. Not Used		
25. Not Used		
26. Elevator tools, including hand tools, computer, proprietary and operational software is received and confirm 1-year service from date of acceptance.		
27. All computers and software required in drawings and specs. are received, including for BAS, Energy and Lighting, Fuel Systems, and Power Management, and any specialty software and alarm codes for operating systems.		
28. For all areas to be transferred to University, all waste and debris removed; floor and wall surfaces clean and in good repair; ceiling surfaces clean, unmarked, in place; site, including sidewalks, cleared of debris and construction equipment; and roof is clear of all materials and debris.		
29. Water chlorination and testing complete and provided by PM to Chief Building Official and BMO via BMO Rep.		
30. Toilet accessories are in place that meet custodial contract.		
31. Trash receptacles outside the building are in place		

University Project Manager (sign & print name) Date

University BMO Rep. (sign & print name) Date

University FSS Rep (sign & print name) Date

University Downtown Rep. (If Necessary) (sign & print name) Date

***Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.**

Mark N/A by item if it is not applicable to project

3.1.12

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Building / Project Acceptance List

Project Name & Number: _____

Contractor: _____

In addition to completing Pre-Acceptance Checklist (SBP-05), the following items must be completed before Final Acceptance.

Activity	Date Completed	Remarks
1. Review State Buildings Pre-Acceptance check list & Notice of Approval of Occupancy / use form with BMO rep & confirm agreement with status		
*2. Establish list of post construction change orders & track separately from basic project until items are complete – call it Phase 2 to avoid delay on basic project		
3. O & M Manuals given to BMO Representative and BMO Archivist (2 hard copies and 1 electronic total)		
*4. Record Documents – a hard copy of plans and specifications are provided for plan room & given to BMO & electronic auto cad & specs are given to Archive Officer (Art Steinman) this is to include landscape drawings showing irrigation installation.		
*5. Final Site Walk is completed with University Grounds Supervisor. Drain barriers are removed and storm drains cleared. MS4 storm water plan, CDPHE permits, and evidence of final closeout received by Project Manager and all copied to University Engineering Division.		
*/**6. **Move-related work items complete including physical move, tours (occupants & police), mail, phone & electrical hook ups for equipment & furniture systems complete & freezers enrolled in University freezer program.**		
7. If exterior work is applicable: Landscape – Include a walk through with University Grounds for 1) new & established 1-year service date; 2) existing damaged landscape is repaired; and 3) irrigation – zone control test is complete.		
8. Attic stock, matches spec. requirements, is located in secured location, and is inventoried.		
9. Electrical system one line diagram framed and mounted in electrical room.		
10. Spare fire suppression heads in cabinets and tool: cabinet in main electrical room includes one complete set of spare fuses for major equipment.		
11. Contractor keys issued by University BMO returned to University Key Shop via PM/ BMO Rep.		
12. Interior Finishes Binder given to the University Project Manager: (Two hard copies)		
13. Not Used		
14. Not Used		

15. Safety grating in pipe chases in place.		
16. Signs in place including monument sign, building exterior and site signage and building interior signage.		
17. All applicable reports, including Air Emission reports; Sewer Reports, including for process diverters, traps and collection tanks; Fuel Storage Tank and Detection reports; and Water System tests and reports provided to BMO via PM and BMO Rep.		
18. Not Used		
19. Not Used		
20. Not Used		
21. Not Used		
22. If commissioning is included for project, Commissioning Agent certification is received by BMO via PM and BMO Rep.		

University Project Manager Date
(sign & print name)

University BMO Rep. Date
(sign & print name)

University FSS Date
(sign & print name)

University Downtown Rep (if necessary) Date
(sign & print name)

*Warranty dates are not subject to completion of these items by contract
<u> Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.</u>**
Mark N/A by item if it is not applicable to project
3.1.12

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Systems, subsystems, and equipment operation and maintenance manuals.
3. Product maintenance manuals.
4. Emergency manuals.
5. Framed operating and maintenance instructions.

B. Related Requirements:

1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 01 91 13 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Schedule: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.

1. Correct or revise each manual to comply with Architect/Engineer's comments. Submit copies of each corrected manual within 15 calendar days of receipt of Architect/Engineer's comments and prior to commencing demonstration and training.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect/Engineer.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Compile entirely from documents with searchable text.
c. Enable inserted reviewer comments on draft submittals.

2. Paper copies. Assemble in accordance with the requirements of this Section.

a. Submit three final copies, one to be retained by the Architect/Engineer and two to be retained by the University.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.

1. Correct or revise each manual to comply with Architect/Engineer's comments. Submit copies of each corrected manual within 15 calendar days of receipt of Architect/Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 GENERAL REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Intent: Prepare data in form of an instructional manual for use by University personnel.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of University.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect/Engineer.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect/Engineer that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

G. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

H. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size and enable OCR (optical character recognition) to provide searchable text.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

I. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in minimum 1 inch and maximum 2 inch thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20 lb., white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 SYSTEMS, SUBSYSTEMS AND EQUIPMENT OPERATION AND MAINTENANCE MANUALS

A. General: Provide operation and maintenance manuals where indicated in individual Specification Section and the following:

1. Heating, ventilating and air-conditioning equipment and systems.
2. Plumbing equipment and systems.
3. Special piping equipment and systems.
4. Electrical distribution systems.
5. Standby generator systems.
6. Communications systems.
7. Fire alarm and detection systems.
8. Underground sprinkler systems.
9. Automatic entrances.
10. Food service equipment.
11. Elevators.
12. Other special construction and conveying systems.

B. Operation Content: In addition to requirements in this Section, include operation data required in individual Specification Sections.

1. Additional Operation Content Required:

a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
b. Performance and design criteria if Contractor has delegated design responsibility.
c. Operating standards.
d. Operating procedures.
e. Operating logs.
f. Wiring diagrams.
g. Control diagrams.
h. Piped system diagrams.
i. Precautions against improper use.
j. License requirements including inspection and renewal dates.

2. Descriptions: Include the following:

a. Product name and model number. Use designations for products indicated on Contract Documents.
b. Manufacturer's name.
c. Equipment identification with serial number of each component.
d. Equipment function.
e. Operating characteristics.
f. Limiting conditions.
g. Performance curves.
h. Engineering data and tests.
i. Complete nomenclature and number of replacement parts.

3. Operating Procedures: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Instructions on stopping.
f. Normal shutdown instructions.
g. Seasonal and weekend operating instructions.
h. Required sequences for electric or electronic systems.
i. Special operating instructions and procedures.

4. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

C. Maintenance Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

1. Source Information: Provide the following information in a list for each product included in manual:

a. Name, address, and telephone number of Installer or supplier and maintenance service agent.
b. Name, address, and telephone number of local source for supply of replacement parts.
c. Name, address, and telephone number of maintenance contractor, where appropriate.
d. Cross-reference Specification Section number and title.
e. Drawing or schedule designation or identifier where applicable.

2. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

    a. Standard maintenance instructions and bulletins.
    b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
    c. Identification and nomenclature of parts and components.
    d. List of items recommended to be stocked as spare parts.

3. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

    a. Test and inspection instructions.
    b. Troubleshooting guide.
    c. Precautions against improper maintenance.
    d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    e. Aligning, adjusting, and checking instructions.
    f. Demonstration and training video recording, if available.

4. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

    a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
    b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

5. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
6. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
7. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

    a. Include procedures to follow and required notifications for warranty claims.
    b. Include information sheet covering proper procedures in event of failure and instances which might affect validity of warranties and bonds.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Separate into two manuals: one for exterior moisture protection products and those exposed to weather and one for interior products. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: Provide the following information for each product included in manual:

    1. Name, address, and telephone number of Installer or supplier and maintenance service agent.
    2. Cross-reference Specification Section number and title.
    3. Drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of University's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.6 FRAMED OPERATING AND MAINENANCE INSTRUCTIONS

A. All mechanically and electrically operated equipment and controls shall be provided with legible and complete wiring diagrams, schematics, operating instructions, and pertinent preventative maintenance instructions in a sturdy frame with clear glass or plastic cover. Use non-fading, permanent media.

B. Locate frames in the same room or service enclosure as equipment, or in the nearest mechanical or electrical room.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Record Samples.
5. Miscellaneous record submittals.

B. Related Requirements:

1. Section 01 73 00 "Execution" for final property survey.
2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. General: Submit record drawings with duplicate original transmittal letters containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Certification that each document as submitted is complete and accurate.
5. Signature of authorized representative of the Contractor.

B. Record Drawings: Submit copies of record Drawings as follows:

1. Submit three paper-copy sets of marked-up record prints, two copies will be retained by the University and one copy retained by the Architect/Engineer.
2. Submit three paper-copy sets and three digital copies on CD of electronic files for all delegated-design submittals. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

C. Record Specifications: Submit three paper copies **of** Project's Specifications, including addenda and contract modifications. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

D. Record Product Data: Submit three paper copies of each submittal. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit three paper copies of each submittal. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

F. Interior Finishes Binder: Three copies. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.
   f. Mark using line types and symbols conforming to Contract Documents.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities referenced to permanent surface improvements.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities referenced to visible and accessible features of structure.
   j. Locations of concealed valves, dampers, controls, balancing devices, junction boxes, cleanouts, and other items requiring access or maintenance.
   k. Changes made by Change Order.
   l. Changes made following Architect/Engineer's written orders.
   m. Details not on the original Contract Drawings.
   n. Field records for variable and concealed conditions.

o. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark additional information important to University that was either shown schematically or omitted from original Drawings.
6. Note Change Order numbers, and similar identification, where applicable.

B. Record Delegated Design Electronic Files: For all delegated design submittals, including but not limited to landscape irrigation, fire alarm and fire sprinkler plans, prepare electronic files in full compliance with University of Colorado Denver | Anschutz Medical Campus Guidelines and Design Standards, Part 1.0, Paragraph "Drawing Production Standards."

C. Identification: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect/Engineer.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to substitutions, selection of options, and similar information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders where applicable.
4. Maintain one complete copy of all Addenda, Change Orders and other written change documents in printed form during construction.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Directory: Include record Product Data directory organized by Specification Section number and title.

C. Product List: Update and record any changes to Product List submitted in accordance with Section 01 60 00 "Product Requirements", including any changes to brand, model, subcontractor, or Installer so that final list reflects materials, equipment and systems incorporated into the Work.

2.4 RECORD SAMPLES

A. Prior to Final Acceptance, meet with University Project Manager and Architect/Engineer at site to review and identify which submitted samples maintained during the progress of the Work are to be transmitted to the University.

B. Deliver selected samples to storage area identified by University.

C. Finishes Binder: Three-ring notebook or notebooks, organized by Specification Section number, providing a listing and description of all material finishes on the Project and including a minimum 6 inch by 6 inch sample thereof to accompany the description. Accompany each material selection indicated with the following:

1. Manufacturer and product name.
2. Pattern name and number, as applicable.
3. Color name, as applicable.
4. Any additional information required to order replacement product.

2.5 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1. Include manufacturer's certifications, field test record, copies of permits, licenses, certifications, inspection reports, releases, notices, receipts for fee payments and similar documents.

B. Directory: Include miscellaneous record submittals directory organized by Specification Section number and title.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project. Update at least weekly.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect/Engineer's and University's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 78 46

EXTRA STOCK MATERIALS

1.1 RELATED DOCUMETS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes descriptions and quantities of required extra stock materials.

1.3 INFORMATIONAL SUBMITTALS

A. Schedule of Maintenance Materials: Prepare a schedule in tabular form of all extra stock materials required in individual Specification Sections including:

1. Specification Section number and title.
2. Description of required material
3. Quantity of required material.

1.4 MAINTENANCE MATERIALS

A. Furnish extra materials that match and are from the same production runs as the product installed.

B. Provide in the quantities indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MAINTENANCE MATERIAL SCHEDULE

SECTION	TITLE	DESCRIPTION	QUANTITY

23 05 13	MOTORS	Variable Frequency Drives	1 complete set of spare fuses for each VFD supplied.
26 20 00	LOW VOLTAGE ELECTRICAL DISTRIBUTION	Fuses	1 set of 3 of each type and size used on the project and fuse cabinet in main electrical room to hold them.

END OF SECTION 01 78 46

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing University's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include outline for each training module.

B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment and products.

C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:

1. Specification Section number and title.
2. Description of required demonstration and training.

D. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training. Manufacturer’s sales staff is not acceptable.

B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
   g. A tour of the installation identifying the location of all system components.

4. Operations: Include the following, as applicable:

   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.
n. Sequence of operation.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.
f. Product support/service model.
g. Purchasing of replacement parts.

9. Instruction specific to Instrumentation and Controls, Electrical Gateway, Network Lighting Controls, or any other new technology that is integrated with another system: Include the following:

a. Overview and theory.
b. Wiring diagrams, including the one line diagram.
c. Creation, editing, and programming of the point database.
d. Integration topology and platform for communication.
e. Graphics packages and touch screens for the system.
f. Alarms and diagnostics.
g. Reporting functions dynamically and historically.
h. Remote access to the system.
i. Database back-up and maintenance.
j. Replacement and re-programming of replacement parts.
k. Point type and functionality for each type of point.
l. Programming.
m. Point/object editing.
n. Loop tuning.
o. Help files and other troubleshooting documentation.

p. Instruction is given by the staff that setup the integration.

C. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct University's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. University will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Coordinate schedule for all training with University Project Manager and provide the following:

a. Minimum 3 weeks notification.
b. Training matrix in calendar format.
c. Training outline for each session.

2. Do not schedule training until equipment has been started up, commissioned, and is currently operating in its normal condition.
3. Do not schedule overlapping training sessions.
4. Schedule training sessions for a maximum of 4 hours per day; afternoons preferred.
5. Provide separate training session on each system for operational/maintenance groups and user groups.
6. Training sessions will be cancelled and rescheduled unless the following documentation is received:

a. Instruction qualifications.
b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.
c. Operation and Maintenance manuals.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Travel, Room and Board: Coordinate any out-of-state training with the University Project Manager.

E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION SCHEDULE

SECTION	TITLE	DESCRIPTION

23 64 16	CENTRIFUGAL WATER CHILLERS	Engage a factory-authorized service representative to train the University's representative for 4 hours including the operation of chillers, accessories and controls, procedures for startup and shutdown, troubleshooting, servicing, preventative maintenance, and review of the maintenance manuals.

END OF SECTION 01 79 00

SECTION 23 05 19 - METERS AND GAUGES

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Chilled and Condenser Water Systems: Provide dial thermometers in wells to indicate supply and return temperatures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Glass Thermometers:
   a. Marshalltown Instruments, Inc.
   b. U.S. Gage
   c. Mueller
2. Direct Mount Dial Thermometers:
   a. Marsh Instrument Co.; Unit of General Signal
   b. Trerice (H.O.) Co.
   c. Weiss Instruments, Inc.
3. Remote Reading Dial Thermometers:
   a. Ametek/U.S. Gauge
   b. Marsh Instrument Co.; Unit of General Signal
   c. Weiss Instruments, Inc.
4. Dual Type Insertion Thermometers and Wells:
   a. Marsh Instrument Co.; Unit of General Signal
   b. Taylor Instrument Co.
   c. Weiss Instruments, Inc.
5. Temperature Gauge Connector Plugs:
   a. Fairfax Company
   b. Peterson Equipment Co.
   c. Universal Lancaster
6. Pressure Gauges and Plugs:
   a. Ametek/U.S. Gauge
   b. Marsh Instrument Co.; Unit of General Signal
   c. Weiss Instruments, Inc.
7. Pressure Gauge Connector Plugs:
   a. Fairfax Company
   b. Peterson Equipment Co.
   c. Universal Lancaster
8. Venturi Flow Measuring Elements:
   a. FDI (preferred)
   b. HCI
   c. Gerand

2.2 MATERIALS, GENERAL

A. Thermometers:
1. Case: Die cast aluminum, finished in baked epoxy enamel, glass front, spring secured, 9 inches long.
2. Adjustable Joint: Die cast aluminum, finished to match case, 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
3. Tube and Capillary: Spirit filled, magnifying lens, 1% scale range accuracy, shock mounted.
4. Scale: Satin faced, non-reflective aluminum, permanently etched markings.

5. Stem: Copper plated steel, or brass, for separable socket, length to suit installation.
6. Range: Conform to the following:
   a. Hot Water: 30 degree - 240 degree F with 2 degree F scale divisions.
   b. Chilled Water: 0 degree - 100 degree F with 2 degree F scale divisions.

B. Dial Type Insertion Thermometers
1. Type: Bi-metal, stainless steel case and stem, 1 inch diameter dial, dust and leak proof, 1/8 inch diameter stem with nominal length of 5 inches.
2. Accuracy: 0.5% of dial range.
3. Range: Conform to the following:
   a. Hot Water: 0 degree - 240 degree F
   b. Chilled Water: 0 degree - 100 degree.

C. Thermometer Wells:
1. Thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2 inch extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well.

D. Temperature Gauge Connector Plugs:
1. Temperature gauge connector plugs pressure rated for 500 psi and 200 degree F (93 degree C). Construct of brass and finish in nickel-plate, equip with 1/2 inch NPS fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8 inch OD probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping.

E. Pressure Gauges:
1. Type: General use, 1% accuracy, ANSI B40.1 grade A, phosphor bronze bourdon type, bottom connection.
2. Case: Drawn steel or brass, glass lens, 4-1/2 inch diameter.
3. Connector: Brass with 1/4 inch male NPT. Provide protective siphon when used for steam service.
4. Scale: White coated aluminum, with permanently etched markings.
5. Range: Conform to the following:
   a. Vacuum: 30 inch Hg - 15 psi
   b. Water: 0 - 200 psi

F. Pressure Gauge Cocks:
1. Brass with 1/4 inch female NPT on each end and “T” handle brass plug
2. 2. Siphon: 1/4 inch straight coil constructed of brass tubing with 1/4 inch male NPT on each end. On steam pipe only.
3. 3. Snubber: 1/4 inch brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.

G. Pressure Gauge Connector Plugs:
1. Provide pressure gauge connector plugs pressure rated for 500 psi and 200 degree F. Construct of brass and finish in nickel-plate equipped with 1/2 inch NPS fitting, and self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8 inch OD probe assembly from dial type insertion pressure gauge. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping.

H. 2-1/2 Inch and Larger Venturi Flow Measuring Elements:
1. Primary flow measuring elements consisting of solid brass or bronze venturi tubes. Tubes larger than 2 inches may be cast iron or steel. Steel tubes may be fabricated or cast with cadmium or zinc-plating. Line throats of cast iron tubes with bronze and plate cast iron portion with cadmium. Each station complete with safety shutoff valves, and quick coupling connections for use with a master portable meter set or individual permanently mounted meter. Tubes calibrated and tested by independent testing laboratory and performance data furnished with shop drawings.
2. Manufacturer shall certify venturi for actual piping configuration. Any necessary piping changes required for certification shall be provided without cost.

3. Provide venturi with throat diameter such that specified rate of flow will register scale reading of between 20% and 80% of full scale value.
4. Unrecovered head loss at maximum flow shall not exceed 10% for venturi used with permanently located meters and shall not exceed 12 inches w.g. when used with portable meters.
5. Provide each primary element with integral tab or metal tag on stainless steel wire extending outside pipe covering on which is stamped or clearly printed in plainly visible position the following information:
   a. Manufacturer's name and address.
   b. Serial number of meter to which element is to be connected.
   c. Name, number or location of equipment served.
   d. Specified rate of flow.
   e. Multiplier (including unity, where applicable) to be applied to meter reading, including correction for operating temperatures and glycol solutions.
6. Provide taps with shutoff valves and quick connecting hose fittings for portable meters.

I. Inches and Smaller Calibrated Balance Valves:
1. Calibrated balance valves equipped with readout valves to facilitate connecting of differential pressure meter to balance valves. Equip each readout valve with integral EPT check valve designed to minimize system fluid loss during monitoring process. Provide calibrated nameplate to indicated degree of closure of precision machined orifice. Construct balancing valve with internal EPT O-ring seals to prevent leakage around rotating element. Provide balance valves with preformed polyurethane insulation suitable for use on heating and cooling systems, and to protect balance valves during shipment.

J. Portable Flow Meters:
1. Provide differential pressure gage and two 12-foot hoses in carrying case with equalizing manifold, check seals, and appurtenances. Plus or minus 2 percent accuracy between 20 to 80 percent of range. Provide master chart for conversion of meter readings to gallons per minute. Provide adapters as necessary.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Temperature Gauges:
1. General: Install temperature gauges in vertical upright position, and tilted so as to be easily read by observer standing on floor.
2. Locations: Provide in the following locations and elsewhere as indicated:
   a. At inlet and outlet of each chiller.
   b. Primary and secondary chilled water supply and return and bridal connection
3. Thermometer Wells: In vertical upright position. Fill well with oil or graphite, secure cap.
4. Temperature Gauge Connector Plugs: Located on pipe at most readable position. Secure cap.

B. Pressure Gauges:
1. General: Provide pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.
2. Locations: Provide in the following locations:
   a. At suction and discharge of each pump.
   b. At inlet and discharge of each pressure reducing valve.
   c. At water service outlet.
   d. At inlet and outlet of water cooled condensers and refrigerant cooled chillers.
3. Pressure Gauge Cocks: Provide in piping tee with snubber. Install siphons for steam pressure gauges.
4. Pressure Gauge Connector Plugs: Located on pipe at most readable position. Secure cap.

C. Flow Measuring Devices:
1. General: Provide flow measuring devices on piping systems located in accessible locations at most readable position.

2. Arrange piping in accordance with manufacturer's published literature. In horizontal pipes, place connections slightly above horizontal centerline of pipe.
3. Install so connections for attachment to portable flow meter hoses is readily accessible
4. Locations: Provide in the following locations and elsewhere as indicated:
   a. At discharge of each pump.
   b. At inlet of each hydronic coil in built-up central systems.
5. Calibrated Balance Valves: Provide on piping with readout valves in vertical upright position. Maintain minimum length of straight unrestricted piping equivalent to 5 pipe diameters upstream and downstream of valve and/or fittings.

3.2 TESTING, CLEANING AND CERTIFICATION

A. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

B. Cleaning: Clean windows to meters and gauges and factory-finished surfaces. Replace cracked or broken windows, repair any scratched or marred surfaces with manufacturer's touch-up paint.

C. Certification: Provide meters and gauges whose accuracies, under specified operating conditions, are certified by manufacturer.

END OF SECTION 23 05 19

SECTION 23 05 23 - GENERAL-DUTY VALVES FOR PIPING

PART 1 – GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. General Information:
1. Show all valves on the drawings. Do not rely on a general note in the specifications or on the plans.
2. For applications up to 2", specify full port ball valves. Butterfly valves are acceptable if pressure and leak risks are low.
3. Valves adjacent to equipment should have unions/flanges provided to allow for removal with minimal labor effort.

B. Isolation Valves:
1. Provide valves for isolating sections of piping systems. It should be possible to isolate; the entire building, separate floors, separate wings, toilet rooms, machinery rooms and other natural subdivisions of the buildings.
2. Provide valves for isolating equipment and fixtures. Place valves on both sides of backflow and check valves to permit inspection.
3. Do not use isolation valves for balancing and do not use balancing valves for isolation.
4. Isolation valves can be ball type (up to 2 inch), gate, or butterfly as deemed appropriate by designer for the type of service, pressure, and fluid.
5. Ball valves are acceptable as isolation valves for most hot water heating systems, domestic water systems, distilled or ionized water systems, blow-down valves, drain valves and other low hazard, low pressure systems.
6. Gate valves are required as isolation valves for steam supply and condensate return systems, chilled water supply systems.
7. Butterfly valves are acceptable alternates as isolation valves for chilled water systems, and other low hazard, low pressure, systems where the entire system can be shut down if necessary to accommodate leaky isolation valves.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hydronic Ball Valves:, Apollo, Crane, Jamesbury orJenkins.

B. Hydronic Gate Valves (less than 2 inches): Stockham, Crane, Grinnell Corp, or Jenkins.

C. Hydronic Gate Valves (2 inches or larger): Crane, Jenkins, Lunkenheimer, or Walworth.

D. Hydronic Butterfly Valves: Dezurik, Crane, Jenkins, Stockham, Keystone orCenterline.

E. Circuit Setters: FDI, Armstrong, Bell & Gossett, Tour Anderson.

2.2 MATERIALS, GENERAL

A. Ball Valves:
1. Blowout proof stems, 3-piece, full port type, brass or bronze body, chrome plated or stainless steel ball, Teflon seals and seat, vinyl-covered handle with memory stop. Pressure rating 150 psi SWP and 600 psi WOG.
2. Ball valves shall be 2 inch or less. Larger pipe sizes shall require gate or butterfly valves.

B. Gate Valves: Solid wedge, rising stem type, except where clearance is a problem.

C. Globe Valves: Renewable disc, rising stem. Install where throttling may be necessary.

D. Butterfly Valves: Cast iron body, lug style, 150 psi pressure rating, aluminum bronze disc, 416 stainless steel stem, EPDM seat. Provide with cap screws instead of stud bolts to permit valve to remain in place with one flange removed.

E. Balancing or Throttling Valves:
1. Use eccentric plug, globe or angle valves for balancing. Do not use gate valves.
2. Butterfly valves equipped with memory stops may be used as balancing valves.

F. Safety Relief Valves: Brass or bronze body, designed, rated, and stamped in accordance with ASME. Steel and cast iron body valves may be used for steam service.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General Duty Valve Applications: The drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff duty: Use valve type as indicated on drawings and in this section.
2. Throttling duty: Use globe (steam only) and plug (heating and chilled water).

B. Install shutoff duty valves at each branch connection to supply mains, at supply mains, at supply connection to each piece of equipment and elsewhere as indicated.

C. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.

D. Install plug valves on the outlet of each heating or cooling element and elsewhere as required to facilitate system balancing.

E. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage. Provide 1/2-inch ball valves with chain end cap at all tops of risers to be used for venting.

F. Install check valves on each pump discharge and elsewhere as required to control flow direction.

G. Install pressure reducing valves on hot water generators, and elsewhere as required to regulate system pressure.

H. Install valves with stems upright or 45 degree maximum, never inverted. When and if steam valves have to be mounted inverted they shall have a valve bonnet drain.

I. Mount all valves so operation is possible without interference from pipes, pipe hangers, walls, etc.

J. Valves (4 inches and larger) located more than 7 feet above floor in mechanical equipment rooms shall be chain operated.

K. Install valves easily accessible. Provide access panels when it becomes necessary to install valves above gypsum ceilings.

END OF SECTION 23 05 23

SECTION 23 05 53 - IDENTIFICATION FOR PIPING AND EQUIPMENT

PART 1 - GENERAL (NOT USED)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Identification Devices:
      a. Seton Name Plate Company
      b. Marking Services, Inc.
      c. National Marker Co.
   2. Paint:
      a. Benjamin Moore
      b. Devoe
      c. Glidden

2.2 MATERIALS, GENERAL

A. Plastic Pipe Markers
   1. Pipe labels that adhere to pipe or insulation surface with directional arrows.

B. Tags:
   1. Engraved anodized aluminum or engraved plastic, 2-inch diameter. Pre-punched and provided with brass chain.

C. Labels and Nameplates:
   1. Laminated three-layer plastic with black engraved letters on light contrasting background color, drilled for mounting with two sheet metal or brass screws. Pressure-sensitive embossed labels are not acceptable.

D. Paint Stencils:
   1. Use metal stencils only. No cardboard stencils are allowed.
      a. Size of Legend and Letters for Stencils:

Insulation or Pipe Diameter	Length of Color Field	Size of Letters
3/4” to 1-1/4”	8”	½”
1-1/2” to 2”	8”	¾”
2-1/2” to 6”	12”	1-1/4”
Ductwork & Equipment	N/A	2-1/2”

E. Paint:
   1. Exterior grade oil-based alkaloid gloss stenciling spray paint. Color complying with NEMA Z535.1.

F. Underground Plastic Line Markers:
   1. Multi-ply tape consisting of solid aluminum foil core between 2 layers of plastic tape, not less than 6-inches wide x 4 mils thick.

G. Valve Schedule Frames:
   1. Provide frames of finished hardwood or extruded aluminum, with non-glare glass.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide pipe identification, valve tags, stencils, or engraved name plates to clearly identify all mechanical equipment, including motors, piping and controls of the various mechanical systems and direction of flow in piping.

B. Plastic Pipe Markers
1. On bare pipe when surface temperature exceeds 180 degree F provide a 1- inch thick insulation band under marker for protection from the hot pipe.

C. Piping, Ducts, and Equipment Identification:
1. Piping:
a. Identify all piping accessible for maintenance in crawl spaces, tunnels, above ceilings, and access spaces as well as exposed to view utilizing stenciled markings according to the following procedures:
1) Use an arrow marker for each pipe-content legend. The arrow shall always point away from the pipe legend and in the direction of flow. Color and height of arrow to be same as content legend lettering.
2) If flow can be in both directions, use a double-headed arrow indication.
3) Apply pipe legend and arrow indication at every point of pipe entry or exit where line goes through wall or ceiling cut.
4) Apply pipe legend and arrow indication within 3 inch of each valve to show proper identification of pipe contents and direction of flow.
5) Apply legend to the pipe so that lettering is in the most legible position. For overhead piping, apply legend on the lower half of the pipe where view is unobstructed, so that legend can be read at a glance from floor level.
6) Pipes under 3/4 inch O.D.: Fasten brass tags securely at specified legend locations.
7) Legend on steam piping, condensate return, compressed air, gas, and vacuum systems: Include working pressure or vacuum.
2. Valves:
a. System service valves located inside the building: Tag and identify as to type of service.
b. Valves or cocks controlling branch mains or risers to various portions of the building: Tag and identified as to service and location.
3. Controls:
a. Magnetic starters and relays: Install nameplates or stencil to identify connecting or controlled equipment.
b. Manual operating switches, fused disconnect switches and thermal over-load switches which have not been specified as furnished with indexed face plates: Install nameplates or be stencil as to controlled equipment.
c. Automatic controls, control panels, zone valves, pressure electric, electric pressure switches, relays, and starters: Clearly identified with unit served and function.
d. Identify all starters, disconnect switches, and manually operated controls, except integral equipment switches with nomenclature corresponding to operating instructions in the "Operation and Maintenance Manual". Coordinate with the university Facilities Operations personnel through the university Project Manager.

3.2 SCHEDULES

A. Piping Identification

Classification	Color of Field	The Campus Letters	Legend
Materials Inherently Hazardous:			
Flammable or Explosive:			
Natural Gas	Yellow	Black	NG
Lab Waste	Yellow	Black	AW
Extreme Temperatures or Pressures:	Yellow	Black	

Classification	Color of Field	The Campus Letters	Legend
Domestic Cold Water	Green	White	Dom CW
Sanitary Sewer	Green	White	SAN
Waste Vent	Green	White	V
Chilled Water Supply	Green	White	CWS
Chilled Water Return	Green	White	CWR
Condenser Water Supply	Green	White	CS
Condenser Water Return	Green	White	CR
Gas or Gaseous Admixture:	Blue	White	
Medium Pressure Compressed Air (30 to 90 psig)	Blue	White	CA
Low Pressure Compressed Air (less than 30 psig)	Blue	White	CA
Vacuum	White	Black	VAC
Fire Quenching Materials:			
Fire Lines	Red	White	FL

B. Mechanical Equipment Naming Strategy:

1. Equipment identification numbers may be up to 32 characters. Equipment naming strategy is:

   System – Bld – Number

   ###-#####-##-###
2. The first three placeholders are reserved for the system designation (alpha characters)
3. The fourth character is a hyphen.
4. The fifth through ninth placeholders are reserved for the building designation (alpha and/or numeric)
5. The tenth character is a hyphen
6. The eleventh through sixteenth placeholders are a “smart number.” It is composed of a two-digit, alpha or numeric, floor location designator followed by a hyphen and a three digit numeric sequential indicator.
7. The seventeenth character is a hyphen
8. In some instances the point name will be followed by a hyphen and a sub-point name
9. All device and point names will be assigned by the Facilities Operations, Building Operations Department.
10. All references to equipment and devices in drawings, labels, equipment tags, BAS system, etc., must use this naming convention.
11. Equipment designation, for prints may exclude the building designator.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SYSTEM PERFORMANCE REQUIREMENTS

A. Require general, mechanical and electrical contractors to coordinate and cooperate with the TAB contractors as necessary to allow them to perform work.

B. Items such as start-up, initial testing, cleaning, calibration of controls, electrical testing, etc., are to be completed prior to the commencement of TAB work.

C. Submit name of balancing and testing agency with resume of the agency, including qualifications of personnel to be used and authority and responsibilities of personnel.

D. Product data shall be submitted, in accordance with Section 23 00 00, for each of the following :

1. Procedure Submittal: Prior to commencing work, submit, for approval, a written procedure of how balance will be performed and a description and manufacturer's name of equipment and instruments to be used. The submittal shall include, but not necessarily be limited to the following:
   a. List of preliminary checks to be performed at the job site such as confirmation that manual volume dampers are present, filters are installed, frequency drive units operational, location of control sensors, etc.
   b. Identify how the air outlets will be measured and the type of instruments to be used.
   c. Locations of pilot traverses and the type of instruments to be used.
   d. Modes of operation that the system will be placed in during balancing and testing, i.e., full cooling and heating, maximum and minimum outside air flows, maximum and minimum sash positions for fume hoods, toilet fans on or off, etc.
   e. Position of doors and windows during balance, i.e., some labs should be balanced with doors shut.
   f. Operating static pressures for terminal devices and pressure sensors for controlled devices.
   g. Method of adjusting outside and return air quantities at air handling units.
   h. Initial test procedures for preliminary balance.
   i. Final test procedures.
   j. List of deficiencies in mechanical system that could hinder the balance work such as missing or leaky dampers, incomplete systems, inadequate fans, etc.
   k. Sample of data sheets and test forms to be used in final report.
   l. Identification and manufacturer's name of equipment to be used on project and proof of last calibration on each piece.
2. Progress Report(s) – Report, in writing, any deficiencies or problems with air or water systems that have affected balance work. Include items that affect system performance such as broken thermostats, damaged ductwork, excessive noise, etc.

1.2 QUALITY ASSURANCE

A. Test, adjust, and balance systems in accordance with ASHRAE Applications Handbook. For NEBB certification, comply with "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems." For AABC certification, comply with "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems."

B. TAB contractors shall present to the University Project Manager and general contractor, proof of current equipment certification approved by National Institute of Standards and Technology.

C. Testing Agency Qualifications: Agency shall be NEBB or AABC certified in testing and balancing disciplines required for this project. Work shall be performed under direct supervision of professional engineer, NEBB, or AABC certified supervisor.

D. Guarantee of Work: TAB contractor shall guarantee the balancing for a period of 90 days from date of acceptance of final report. During this period, the TAB contractor shall make personnel available at no cost to the university to verify measurements and/or correct deficiencies in the balance. During this period, emergency adjustments shall not void this warranty.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Pre-Balancing Conference: Before beginning testing, adjusting, and balancing procedures, schedule and conduct a conference with University Project Manager, Facilities Operations Representative(s) and representatives of installers of mechanical and control systems. Conference objective is final coordination and verification of system operation and readiness for testing, adjusting, and balancing, and assigning testing responsibilities of each installer.

B. Systems shall be complete and fully operational prior to beginning procedures. Insure all items such as thermometer wells, pressure test-cocks, access doors, etc., are installed to facilitate tests and adjustments.

C. Put all heating, ventilating, and air conditioning systems and equipment into full operation and continue operation during testing and balancing.

D. Before air balance work is started, check system for duct leakage, install a complete set of clean filters, check for correct fan rotation and equipment vibration, and check automatic dampers for proper operation. Set volume control dampers and outlets in wide open position. Ensure fire dampers are open and that return air paths are not obstructed.

E. Prior to performing hydronic balance work; check system for plugged strainers, proper pump rotation, and proper control valve installation and operation. Check air vents at high points of systems to ensure all are installed and operating freely (automatic type) or bleed air completely (manual type); and verify proper flow meter and check valve installation and proper system pressure.

F. All throttling devices and control valves shall be set open.

G. Performing Testing, Adjusting, and Balancing:
1. Cut insulation, ductwork, and piping for installation of test probes to minimum extent necessary to allow adequate performance of procedures.
2. Patch insulation, ductwork, and housings, using materials identical to those removed.
3. Reseal ducts and piping, and test for and repair leaks.
4. Reseal insulation to re-establish integrity of the vapor barrier.
5. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other permanent identification materials.
6. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

H. Sequencing and Scheduling:
1. Systems shall be fully operational before beginning procedures.

2. Conduct tests in the presence of the University Project Manager after providing 7-day notice before any test is to be conducted. Provide water and electricity required for tests. Determine that all dampers, registers, and valves are in a set or full open position.

I. Balancing:
1. Water Balance:
a. Balance water piping and snow melt systems to produce water quantities within 5 percent of design flow rates for cooling water systems and within 10 percent of design flow rates for heating water systems.
b. Hydronic systems shall be proportionally balanced, ensuring the path to one terminal is fully open. Total system flow shall be adjusted at pump by restricting discharge balancing valve.
c. Indicate and record final position of balancing valves.
d. Primary-Secondary Flow Systems: Balance primary system crossover flow first, then balance secondary system.
e. Chillers:
1) Balance water flow through each evaporator and condenser with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed flow for maximum tube velocity recommended by chiller manufacturer. Perform tests and record data with each chiller operating at design conditions for:
a) Evaporator and condenser water entering and exiting temperatures, pressure drop, and water flow.
b) Evaporator and condenser refrigerant temperature and pressures.
c) Calculate capacity in tons.
2) For air cooled chillers, verify condenser fan rotation and record fan data, including number of fans and entering and exiting air temperatures.

J. Report:
1. Report Format: Standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Include information indicated on standard report forms prepared by AABC or NEBB for each respective item and system, and schematic diagrams for each system or piece of equipment to accompany each respective report form. Bind report forms complete with schematic systems diagrams and other data in reinforced vinyl three-ring binders. Provide binding edge labels with project identification and a title descriptive of contents. Divide contents of binder into following divisions, separated by divider tabs:
a. General Information and Summary
b. Hydronic Systems
c. Sound and Vibration Systems
d. Recommendations.
2. Report Contents: Provide following minimum information, forms, and data:
a. General Information and Summary:
1) Inside cover sheet to identify testing, adjusting, and balancing agency, contractor, and project name. Include contact names, addresses, and telephone numbers.
2) Certification sheet containing seal, address, telephone number, and signature of Certified Test and Balance Engineer.
3) Listing of instrumentation used for procedures along with proof of calibration.
b. Test Data: Report shall include the following data, in addition to certified field report readings taken during the balancing and testing operations. Include required or specified reading, first reading taken, and final balanced reading.
1) Hydronic Balance:
a) Chiller and motor nameplate information.
b) Pump and motor nameplate information. Include manufacturer's pump curves.
2) Record thermal protection for all motors. Starter brand, model, enclosure type, installed thermal heaters and rating of heaters, required thermal heaters and rating of heaters if different from installed shall be recorded.
3) Include sheet that reports method of balance, project altitude, and any correction factors used in calculations.

4) Prepare list of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.2 TESTING, CLEANING AND CERTIFICATION

A. After cleaning, pressure tests, adjusting, and balancing are complete, each system shall be performance tested as a whole to verify that all items perform as integral parts of system, and temperatures and conditions are evenly controlled throughout building. Make corrections and adjustments as required to produce conditions indicated.

B. Provide four (4) copies of testing, adjusting, and balancing report bearing seal and signature of the TAB Engineer. The report shall be certification that systems have been tested, adjusted, and balanced in accordance with referenced standards; accurate representation of how systems have been installed; and accurate record of all final quantities measured.

C. Final Report:

1. Submit a preliminary report within 30 days of completed TAB work. Report shall include the following information.
   a. A general discussion preface section. This section shall summarize all abnormalities or problems encountered during the project and what course of action was taken. This summary should be assembled from the written progress reports described earlier, except that it will be expanded to include responses from the Engineer, the University Project Manager and Contractor regarding each problem indicated in the progress reports.
   b. Copies of correspondence if related to the performance and balance of the systems.
   c. Status of doors, windows and equipment static pressures during balance work.
   d. Reduced 11" x 17", readable, as-built drawings obtained from the University Project Manager. All devices and equipment shall be clearly labeled.
   e. Belt and sheave information, fan and motor nameplates information, full load operating voltage and amperage indicate sheave diameter as pitch diameter.
   f. Design and final actual cfm at each system terminal unit. Include terminal/size, inlet static pressure, temperature and velocities read to attain the design cfm.
   g. Overload protection for all motors shall be recorded. Starter and brand model, enclosure type, installed overload devices, original ratings, and set points (and revised device ratings and set points when application) shall be recorded.
2. Any corrective action shall be completed and the systems re-tested. The corrected system information shall be provided in the final report.
3. Final Report shall be completed within 30 days of preliminary report.

3.3 COMMISSIONING (DEMONSTRATION)

A. Upon request of the university Facilities Operations Representative, through the University Project Manager, the balancing firm shall demonstrate measured quantities of randomly selected equipment. The number of readings verified will not exceed 10 percent of the total in the report.

END OF SECTION 23 05 93

SECTION 23 07 00 – INSULATION

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Provide minimum insulation thickness as suggested in ASHRAE Standard 90A.

B. Provide removable insulation for chilled water pumps and specialty valves and fittings.

1.2 DEFINITIONS

A. Concealed: As used in this Section refers to insulation in ceiling plenums, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, unexcavated areas, and crawl spaces.

B. Exposed: As used in this Section refers to insulation that is not concealed.

1.3 QUALITY ASSURANCE

A. Composite insulation, including jackets, coverings, sealers, mastics, and wet or dry adhesives shall have a flame spread rating of 25 or less and smoke-developed rating of 50 or less, as tested by ASTM E84.

B. Elastomeric foam with a smoke-developed rating of 150 or less may be used, except in ducts, plenums, and concealed spaces that are part of the air distribution system

C. PVC fitting covers shall have a maximum flame spread of 25 or less and are exempted from the smoke spread criteria.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Insulation: Identification and/or type of material from a manufacturer is as shown under each heading of 2.2 Materials, General.
      a. Manville Products
      b. CertainTeed.
      c. Rubatex
      d. Knauf
      e. Pittsburgh Corning
   2. Adhesives, Coatings, and Sealants:
      a. Foster
      b. Childers Product Company
      c. Hardcast

2.2 MATERIALS, GENERAL

A. Pipe Insulation:
   1. Glass Fiber:
      a. Manville Micro Lok AP T Plus
   2. Hydrous Calcium Silicate:
      a. Rigid, molded block, conforming to ASTM C533.Asbestos-free, color-coded throughout material. Coding shall remain stable throughout rated temperature range.
      b. Thermal Conductivity (k Value): 0.40 at 300 degrees F.
      c. Maximum Service Temperature: 1,200 degrees F.
      d. Compressive Strength: Minimum of 160 PSI to produce 5% compression at 1-1/2 inch

thickness.
e. Tie wires: 16 gauge stainless steel.
f. Manville Thermo 12/Gold
3. Elastomeric Foam:
a. Flexible, cellular, molded or sheet; conforming to ASTM C534.
b. Thermal Conductivity (k value): 0.27 at 75 degrees F.
c. Maximum Service Temperature: 220 degrees F.
d. BBX, K-Flex acceptable for high temp applications to 300 deg F.
e. Connection Adhesive: Waterproof, vapor retarding, Rubatex R-373.
f. UV protective coating: Water-based latex enamel paint. Rubatex 374.
g. Insulation Tape: Elastomeric thermal insulation tape with closed-cell structure.
h. Rubatex R-180-FS/R-1800-FS,.
4. Cellular Glass:
a. Waterproof, closed cell, rigid insulating material composed of sealed glass cells conforming to ASTM C552.
b. Thermal Conductivity (k value): 0.35 at 75 degrees F.
c. Density: 8 pounds per cubic foot.
d. Water-vapor Permeability: 0.005 perm-inch.
e. Pittsburgh Corning Foamglass.

B. Field Applied Pipe and Fitting Jacketing:
1. PVC Plastic: One-piece, UV-resistant, 20-mil thick, molded type, gloss white finish with fiberglass insulation insert for fittings.
a. Manville Zeston 2000 (indoors).
b. Manville Zeston 300 (outdoors).
2. Aluminum:
a. 0.016-inch thick sheet with smooth or embossed finish, longitudinal slip-joints with 2-inch laps.
b. Sealant: Weatherproof.
c. Fitting covers: Die shaped with factory attached protective liner.
3. Canvas:
a. Plain weave cotton treated with fire-retardant lagging adhesive.
b. Weight: 6 ounces per square yard.
c. UL listed fabric.
4. Stainless Steel:
a. 0.010-inch thick, type 304 stainless steel with smooth or corrugated finish.

C. Utility Vault Pipe Insulation
1. Chilled water supply and return insulation
a. Closed-cell fiberglass
b. Required insulation thickness
c. All insulation surfaces shall be protected by metal jacketing

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

A. Overview:
1. Install insulation only after piping, ducts, and equipment have been tested and approved by the Project Manager, and after all other tests and certifications which are required by the specifications have been satisfactorily completed.
2. Continue insulation vapor barriers through penetrations except where prohibited by code.
3. Install pipe and duct insulation continuous through wall and floor openings except where the penetrated surfaces or assemblies are fire-resistance rated. Provide fire-stop insulation at penetrations of fire-rated surfaces and assemblies. Maintain fire-resistance ratings of penetrated surfaces and assemblies.
4. Install insulation on cold surfaces with a continuous, unbroken vapor seal. Insulate and vapor seal supports and anchors, which are directly secured to cold surfaces.

5. Seal all exposed raw edges of insulation with vapor retarder or finishing cement.
6. Do not use staples on vapor barrier jackets. Where staples must be used, thoroughly seal the vapor barrier penetrations with a white vapor-barrier finish. The Engineer prior to installation must approve use of staples.
7. Do not weld insulation support pins to pressure vessels.
8. Leave all insulation surfaces dry and clean, and ready for subsequent work.

B. Installation of Piping Insulation:
1. Install insulation and covers with seams in the least visible location.
2. Neatly finish insulation at supports, protrusions, and interruptions.
3. Verify piping wells and P & T taps are extended so that they will be flush with the surface of the finished insulation.
4. Insulated dual-temperature piping systems and for insulated piping conveying fluids of a temperature less than the ambient temperature: Install vapor-retardant jacket with self-sealing lap joints. Insulate the complete systems.
5. Insulated piping conveying fluids of a temperature greater than the ambient temperature: Install vapor-retardant jacket with self-sealing lap joints. Bevel and seal ends of insulation at equipment, flanges, and unions.
6. Piping conveying cold fluids: Insulate continuous through hangers. Install rigid insulation inserts at pipe hangers and supports. Butt inserts tight to insulation. Apply a wet coat of vapor-barrier lap cement on butt joints and seal the joints with three-inch wide vapor-barrier tape or band.
7. Install calcium silicate insert between support shields and piping for piping 1-1/2 inches and larger. Inserts shall not be less than the following lengths:

Pipe Size Inches	Insert Length Inches
1-1/2	6
2 through 9	9
10 through 14	12
16 through 24	18

8. Exposed piping in mechanical equipment rooms and exposed piping within 10 feet of the finished floor in finished spaces: Install PVC jacket and fitting covers or aluminum jacket.
9. Exterior applications: Install PVC jacket and fitting covers or aluminum jacket over insulated pipe, fittings, joints, and valves. Locate jacket seams on bottom side of horizontal piping. Cover all valves, flanges, unions, accessories, and fittings with aluminum jacket. Seal jacket watertight and secure with lock type aluminum bands.
10. Refrigerant piping insulated with elastomeric insulation: Seal joints with elastomeric sealant made by same manufacturer as the insulation. For outdoor locations, paint insulation white or silver. Paint shall be compatible with the insulation.
11. Piping under concrete slabs on grade: Spiral wrap insulation with Protecto Wrap 200 coating with 50% overlap. Lay the insulated and wrapped piping on a 3-inch bed of sand and cover with 3 inches of sand all around.

C. Installation of Insulation on Fittings and Valves:
1. Factory premolded one piece PVC insulated fitting covers: Use factory precut insulation applied to the fitting using two layers for pipe temperatures above 250 degrees F or below 35 degrees F, single layer insulation is acceptable between 35 degrees F and 250 degrees F. Tuck the ends of the insulation snugly into the throat of the fitting and the edges adjacent to the pipe covering, tufted and tucked in, fully insulating the pipe fitting. Covers shall overlap the adjoining pipe insulation and jackets, and on cold pipes seal at all seam edges with vapor barrier adhesive. Seal circumferential edges of all covers with pressure sensitive vinyl tape. The tape shall overlap the jacket and the cover at least one inch.
2. Where PVC covers are prohibited: Use as an alternate one of the following methods: aluminum covers, one coat insulation cement, premolded fiberglass fitting covers, or mitered segments of pipe insulation. Finish for non-PVC or aluminum shall be glass fabric embedded in fire retardant mastic lapped 2 inches over piping insulation. Finish with second coat of mastic. Mastic shall be vinyl acrylic mastic Childers CP-11 for hot piping and shall be Childers CP-30 or Fosters 30-35 or equal for cold piping.
3. Valves may be insulated with sections of fiberglass pipe insulation complete with All Service Jacket. Raw ends shall be coated with vinyl acrylic mastic Childers CP-11 for hot piping or shall be coated with vapor barrier mastic Childers CP-30 or Fosters 30-35, or equal for cold piping.
4. Insulate balancing cocks, strainer drains, hose bibs, and equipment requiring periodic maintenance with segmental insulating with an integral vapor barrier. Insulation and vapor barrier shall be easy to remove and replace.

END OF SECTION 23 07 00

SECTION 23 09 13 - INSTRUMENTATION AND CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. The devices listed in this section are control system field devices generally connected to the Building Automation System. These devices have been placed in a separate section for clarity. See Section 23 09 00 for system standard and for items not clarified in this section.

B. Include all required factory and field calibration of each instrumentation device to accurately measure and control the desired variable.

C. Chilled water connections and parameters from the Central Utilities Plant (CUP) to the individual buildings are further defined in Part 3 of the Manual of Guidelines and Standards for Design and Construction Projects and in the university Metering Standard.

D. All wiring requirements in this section shall be considered in addition to the requirements in Division 26 not in place of Division 26.

PART 2 - PRODUCTS

2.1 GENERAL

A. All input and output devices will be of the type which are universally accepted in the industry, can easily be second sourced and are fully compatible with the BAS.

B. Required components:
1. All components shall be included to meet the intent of section 23 09 93
2. Pilot positioners shall be included where necessary to assure smooth operation of all analog pneumatic outputs.

2.2 SYSTEM INPUTS OR MEASUREMENT DEVICES

A. General
1. All sensor and signal conditioning equipment will be of the type which are universally accepted in the industry, can easily be second sourced and are compatible with all of the manufacturer's equipment.
2. See section 23 09 93 for required points.
3. Provide components that are fully compatible with the Building Automation System (BAS). Include all required factory and field calibration of each instrumentation device to accurately measure the desired variable.
4. All sensors to be installed in conditioned areas to prevent damage to the device. All devices to be installed in areas within the operating range of the device.

B. Temperature Transmitters:
1. General: Temperature sensor/transmitters shall have ranges appropriate for applications, input resolution of 0.2 Deg. F, accuracy of .4 degree F and stability of .3 degree F over the entire span. Pneumatic sensors are not allowed.
2. Space:
   a. Space sensors (non-flush mounted) shall be provided with a portable service tool jack. Set-point adjustment will only be required as needed by LEED or the specific sequence of operation.
   b. Sensors (non-flush mounted) shall be capable of providing temporary zone or building controls override, as needed by LEED and the specific sequence of operation.
   c. Occupancy adjustment will only be required as needed by LEED or the specific

sequence of operation.

C. Differential Pressure Transmitters – Air and Water:
1. General: The differential pressure transmitters shall be temperature compensated.
2. Performance:
a. Sensing range shall be suitable for the application with accuracy of +/- 1% including hysteresis and non-linearity of range and repeatability of +/- 0.2% of range.
b. The sensor element shall be capable of withstanding up to 800% of rated pressure without damage.
c. The sensor range shall be selected such that the anticipated set-point is approximately mid-range. Range may be larger if necessary to keep all anticipated measurements within the range.
3. Water Application:
a. For all water measurements, provide an isolation valve manifold and a permanently installed local visual gauge.
b. The sensor element shall be capable of withstanding a pressure of twice the full scale pressure.
c. Sensors shall have a minimum range of 0 - 50 PSI and a minimum of 100 PSI line pressure

D. Flow Sensor –Chilled Water Meter :
1. Ultrasonic Type: Piping location for meter must meet the manufacturer's recommendation for minimum specified length of straight pipe The metering of the cooling energy (chilled water) is based on the total BTU (British Thermal Units) of energy delivered to the building converted to cooling Ton-hours. Determination of Ton-hours of energy requires a minimum of two temperature sensors (one on the supply line, one on the return line) and a flow meter, preferably on the supply line (building chilled water design conditions are CHWS=41 degree F and CHWR=56 degree F). Meter data communication must be coordinated with Building Automation System (BAS) interface requirements provided by Siemens. Acceptable communication protocols are Modbus and BACnet.
2. Meter must be in place and demonstrated to be operational to campus energy engineer prior to utility start-up.
a. Dual channel transit time flow and energy meter. Utilize 2 meters for single channel meters.
1) Channel 1 for primary chilled water.
2) Channel 2 for secondary chilled water.
b. High precision clamp-on flow transducers.
c. Insertion (wetted) type RTDs w/ 4 wire output (balanced) individually accurate to within 0.1 degree F and provided as a matched pair.
d. NEMA 4X enclosure.
e. Alphanumeric LCD display with user selectable display options.
f. Integrated energy (Ton-hour) totalizer with reset possible only with security code or non-resettable.
g. Integrate meter data registers via approved communication protocol into Siemens BAS panel. Minimum required registers shall be water flow rate, supply and return temperatures, cooling tons, totalized ton-hours.
h. Display shall be installed at eye level while standing on floor.
i. Mounting hardware.
j. RTD and flow transducer cables.
k. Calibration certification.
l. Acceptable Manufacturers: Siemens SITRANS FUE1010 series, Spirex/Sarco UTM10-E series, Sierra Instruments InnovaSonic 205i series

2.3 SYSTEM OUTPUTS OR CONTROL DEVICES

A. Control Relays:
1. Shall be UL listed plug-in type with dust cover and LED "energized" indicator or RIB with indicator.
2. Contact rating, configuration and coil voltage shall be suitable for the application.

B. Manual Control Switches:
   1. Shall be UL listed for use in NEMA 1 enclosures with contact arrangement and rating suitable for the application.
   2. Bat handle or knob actuator with nameplate clearly identifying function of each switch position.

C. Low Temperature Protection Thermostats:
   1. General:
      a. Shall be the manual reset type.
      b. The element shall be properly supported to cover the entire downstream side of the heating coil with a minimum of three loops.
      c. Separate thermostats shall be provided for each 25 square feet of coil face area or fraction thereof.
      d. Provide a single point for low temperature reset button when 8 or more low temperature detectors are installed.
   2. Performance:
      a. The set point shall be adjustable with a minimum range of 34 F to 50 F.
      b. The thermostat shall operate in response to the coldest one foot length of the 20 sensing element regardless of the temperature at other parts of the element.

D. Differential Pressure Switches:
   1. Pressure differential switches (air or water service) shall be UL listed, Snap-acting, pilot duty rated (125 VA minimum), NEMA enclosure appropriate for the application, with scale range such that an adjustable set point is approximately at the mid-point of the device span.
   2. Provide metal pitot tubes for airside differential pressure switches measuring duct static.

E. High/Low Static Pressure Limit Switches:
   1. Shall be UL listed line voltage snap-acting pilot duty rated (125 VA minimum), NEMA 1 enclosure.
   2. Provide manual reset unless otherwise required by the application
   3. Provide metal pitot tubes for airside differential pressure switches measuring duct static.

F. Current Sensing Switches:
   1. Shall be UL listed for line voltage with SPDT snap-acting, pilot duty rated (125 VA minimum) with range such that the set-point is at approximately the mid-point of span of the device.
   2. Provide a maximum switching differential of 0.5 amps.

G. Valve or Damper Limit (End) Switches:
   1. Shall be UL listed line voltage SPDT snap-acting pilot duty rated (125 VA minimum) NEMA 1 enclosure, with roller type actuating arm suitable for damper position application.
   2. Provide end open and closed status switches as a minimum on all motorized valves utilized for equipment isolation. Provide end switches on all isolation dampers.

H. Positive Positioners:
   1. General: Shall be high capacity force balance relay type with suitable mounting provisions and position feedback linkage tailored for particular actuator.
   2. Performance:
      a. The positioner shall reposition the actuator on an input (pilot) signal change or 1/8 PSI or less.
      b. The repeatability shall be +/- 2%.

I. Control Valves – Globe:
   1. General: All control valves, unless otherwise required by application, shall meet the following:
      a. All modulating valve/actuator combinations for water application shall have linear flow or equal percentage characteristics in relationship to valve actuator input.
      b. The minimum close-off rating of any-two valve/actuator combination shall be 110% of the total system (pump) head for water application or 50 psid, whichever is greater.
      c. Valves shall have valve position indication on the valve.

d. Water valves utilized in modulating applications shall be sized for a 4 to 6 psi drop with a maximum of 7 psi and a minimum of 3 psi. Application with flows less than 2 gpm may utilize pressure drops less than 3 psi.
e. The valves shall be rated to 240 deg. F and 125 psig, two-way or three-way as required.

2. Valves ½" to 1":
   a. The valve body shall be nickel plated brass or bronze and provided with sweat or screwed fittings as required.
   b. Provide a screwed type with NPT fittings. Provide valves with equal percentage or linear flow characteristics.
3. Valves 1" to 6":
   a. The valve body shall be cast iron with a chrome nickel steel or stainless steel seat and inner valve material.
   b. Valves 1" to 2" shall be screwed type with NPT fittings.
   c. Valves 2-1/2" and larger shall be flanged.
   d. Provide linear flow characteristics.
4. Valves 6" and Greater: Provide one of the following types:
   a. Rotary globe valves equal to Masonelian Camflex II. Provide equal percentage or linear flow characteristics.
   b. Linear globe valves equal to Fisher. Provide equal percentage or linear flow characteristics.
   c. High performance butterfly valves/actuator combination that shall provide equal percentage flow characteristics at low flow. Provide Keystone K-Loc.

J. Control Valves – Butterfly:
1. General:
   a. Butterfly valves shall not be utilized for any modulating applications with valve sizes of six inches and under.
   b. Butterfly valves utilized for two-position control shall be line-sized.
   c. The minimum close-off rating for any two-way valve/actuator combination shall be 110% of the total system (pump) head for water application or 50 psid, whichever is greater.
   d. All valves shall have valve position indication on the valve.
2. Construction:
   a. Two-way and three-way butterfly valves shall have:
      1) a cast iron valve body
      2) aluminized bronze disc
      3) stainless steel stem
      4) disc seal suitable for bubble-tight shut off

K. Control Valves – Ball:
1. General:
   a. Ball valves shall not be utilized for modulating control unless approved by the engineer prior to bid. Exception: Only characterized ball valves providing equal percentage flow characteristics will be considered for modulating control applications.
   b. The minimum close-off rating for any two-way valves/actuator combination shall be 110% of the total system (pump) head for water applications or 50 psid, whichever is greater.
   c. All valves shall have position indication on the valve.
   d. The pressure drop calculations shall include the pressure drops of the fittings required to install a valves several sizes smaller than the pipe it is being installed in.
2. Ball Valves (2" or less):
   a. Valves shall utilize bronze bodies with female NPT threads. Valve bodies may also be stainless steel, titanium or nickel with operating pressure up to 2000 psi.
   b. Provide a blowout proof stem design, glass-reinforced Teflon thrust seal washer and stuffing box ring with minimum 600 psi rating. Stem packing gland screw shall be adjustable for wear.
   c. Standard chromium plated bronze ball or where specified, stainless steel ball and stem, shall be rated at a minimum of 600 psi water, cold, non-shock service, and 150 psi for saturated steam service. All valves shall be provided with reinforced Teflon seats.
3. Ball Valves (2-1/2" to 6"):
   a. Valves shall have flanged carbon steel or stainless steel bodies rated at 150 psi working

pressure.

b. Provide a blowout stem design and reinforced PTFE thrust seal washer.

c. Provide a stainless steel ball and stem and reinforced PTFE seats, packing and o-ring.

L. Control Valves – Chilled water Infrastructure Connection

1. General:
   a. The control valve must be a two-way valve design.
   b. The control valve must be of industrial quality.
   c. When combined with actuator, the assembly must deliver a minimum 100:1 turn-down ratio.
   d. The minimum close-off rating any two-way valve/actuator combination shall be inlet pressure of 100 psi (230' W.C.) differential.
   e. All valves shall be sized for 3-5 PSID pressure drop across the valve at full flow.
   f. All valves shall have valve position indication on the valve.
   g. All modulating valve/actuator combination for this application shall have equal percentage flow characteristic in relation to valve actuator signal input.
2. Construction:
   a. The valves shall be two-way with a rating to 360 deg. F up to 230 psig.
   b. The valve body shall be cast iron with a chrome nickel steel or stainless steel seat and inner valve material.
3. Acceptable Manufacturers: Keystone, Fisher, or approved equivalent.

M. Valve Actuators – Chilled water Infrastructure Connection

1. General:
   a. Shall provide tight close-off at design system pressure and shall provide smooth modulation at design flow and pressure conditions.
   b. The control valve actuator must be of industrial quality.
   c. When combined with actuator, the assembly must deliver a minimum 100:1 turn-down ratio.
   d. The minimum close-off rating any two-way valve/actuator combination shall be inlet pressure of 100 psi (230' W.C.) differential.
   e. The valve actuators shall be electrically actuated with proportional modulation and must fail in place.
   f. All modulating valve/actuator combination shall have valve position indication on the actuator.
   g. All modulating valve/actuator combination for this application shall have equal percentage flow characteristic in relation to valve actuator signal input.
   h. Provide a hand wheel or manual position dial to allow manual positioning of valve.
   i. Provide actuators with internal heaters if installed outdoors.
   j. Provide end (limit) switches for open/closed position indication feedback.
   k. Provide a position indicator feedback signal. Signal shall supply a mA or VDC analog feedback signal. It shall have infinite resolution with a linearity error of less than +/- 1% of full span.
   l. Upon loss of analog control signal, the actuator shall have the ability of to stay in place, drive fully open, drive fully closed or drive to a pre-determined position.
2. Construction:
   a. The actuator shall function normally at temperatures of 40 to 185 degrees F, 0-99 % humidity, and withstand short temperature excursions 10% above the rated temperature with no permanent damage to the unit.
   b. The motor shall be a no burnout type, with no duty cycle limitations, capable of 60 starts and stops per minute for high-demand times such as start-up and process upsets.
   c. The actuator shall hold a minimum of 200% of the rated torque when the motor is de-energized
3. Acceptable Manufacturers: Beck, or approved equivalent.

N. Electronic Actuators:

1. Valve Actuators for Butterfly Valves:
   a. Shall provide tight close-off at design system pressure and shall provide smooth

modulation over the full range of expected flow and pressure conditions.

b. Provide actuators with internal heaters if installed outdoors.

c. Provide 2 sets of end switches, one set for limiting of the stroke, the other set for open/closed position indication feedback.

d. Provide a hand wheel at the valve or manual position dial mounted in the BAS panel to allow manual positioning of valve.

2.4 AUXILIARY EQUIPMENT

A. Building Automation System (BAS) Controls Transformers:

1. Shall be UL listed Class 2 current limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.

B. Enclosures:

1. General:
   a. Mounting: All Controllers, Relays, Transducers, transmitters, relays, etc. shall be housed in a NEMA enclosure rated for the installed conditions.
   b. Panels shall be NEMA type suitable for applications as required with hinged door and key-lock latch.
2. Terminations and Connections:
   a. Interconnections between internal and face-mounted devices pre-piped and wired with color-coded tubing/conductors shall be neatly installed in plastic tray and/or tie-wrapped.
   b. All wiring within the panel shall be shall be run in wiring tray in accordance with NEMA and UL standards, and shall meet all local codes.
   c. Terminals for field connections shall be UL listed for 600V service, individually identified per control shop drawings, with adequate clearance for field wiring.
   d. Control air terminations for field connection shall be individually identified as per control shop drawings.
3. General Application Controller Panel Enclosures
   a. Provide a 120 VAC receptacle in each panel, and a fused on /off power switch for the panel power supply. Where ganged together panels within 8 feet of each other may be served by the same convenience 120 VAC receptacles.
   b. Provide a main air gauge for control power sources to each local panel containing pneumatic controls. Provide air gages for each pneumatic output. Indicator lights on BAS outputs similar to Siemens module PTM6.1 do not meet this standard.
   c. Provide a final as-built control drawing of panel and related devices, reduced, laminated, and mounted inside of the panel door.
   d. Use of existing control panels to house new controllers is discouraged. Use of existing control panels for junction panels is acceptable under the following conditions.
      1) All excess devices, wiring and tubing shall be removed.
      2) All remaining devices, wiring and tubing shall be tagged and neatly revised.

C. Wiring and Conduit:

1. All wire will be copper and meet the minimum wire size for the application.
2. Input wiring shall not be in the same conduit as power wiring. Communication wiring shall not be in the same conduit as power or output wiring.
3. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.
4. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum ½ inch galvanized EMT. Compression fittings shall be used for interior locations and watertight compression fittings for exterior locations. Provide conduit seal off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.
5. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuator controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.
6. Junction boxes shall be provided at all cable splices, equipment terminations, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with cover. Exterior and damp location J-boxes shall be cast alloy FS boxes with

threaded hubs and gasket sealed covers.

7. Wire inside walls should be in conduit, low voltage wire in ceilings should be ran in the information system cable tray and should enter room along with other low voltage wiring through a 2” conduit from the cable tray to a point of penetration in the adjacent room and run on J Hooks or bridle rings in the ceiling space of a room.
8. Low Voltage/Wire and Cable: All LV/W&C shall be run in conduit in floors and walls spaces. In hallways LV/W&C shall be run in the common telecom and other low voltage system cable tray. LV/W&C must be run in a conduit sleeve, minimum 2” dia. with plastic bushings, from the point it leaves the cable tray to the interior side of a room. Once the LV/W&C enters the room it can be supported from bridle rings or j-hooks. Wiring shall comply with Section 28 31 00 and approved NEC.
9. Low Voltage/Wire and Cable and Hallway Devices: LV/W&C running from the cable tray to devices in the hallway shall be protected by plenum rated flexible sleeving or flexible metal conduit. LV/W&C in sleeving or flexible metal conduit shall be supported per NEC and installed with UL approved connectors and plastic bushings on both ends.
10. Low Voltage/Wire and Cable Insulation Sleeve Color: BAS conductor insulation colors allowed are:
    a. Points Blue Jacket
    b. BLN Orange Jacket
    c. FLN Orange with blue stripe jacket
    d. Power Dark blue or black jacket
11. Where the space above a suspended ceiling is a supply or return air plenum, any wiring not run in conduit shall be plenum rated. EXCEPTION: Any wire run in suspended ceiling that is used to control outside air dampers, provide smoke control functions or to connect the system to the fire management system shall be in conduit.

PART 3 - .EXECUTION

3.1 INSTALLATION, GENERAL

A. Remote control devices not in local panels shall be accessible for adjustment and service-below 7’ above finished floor whenever possible.

B. All transducers, transmitters, relays, etc., shall be mounted in a panel with hinged doors in an orderly manner and shall be properly labeled with permanent labels to identify the parts of the system being served. All thermostats shall be labeled with device number and point address.

C. Component panels shall be mounted at eye level for accessibility and service, and located within 50 feet of the system served, unless otherwise shown on the plans.

3.2 SYSTEM INPUTS OR MEASUREMENT DEVICES

A. Temperature Sensors:
1. Water:
    a. Temperature sensors for liquids and steam shall be installed in wells of appropriate type for the application. Strap on sensors will not be accepted.
    b. Coordinate the locations of all thermo wells to provide for accurate and reliable temperature readings.
    c. Provide heat conductive compound between the well and sensor element.

B. Flow Meters
1. All weld-o-lets for flow meters must be installed in a manner that no lip is in the pipe.

C. Differential pressure Switches
1. All differential pressure switches shall be calibrated to specifications provided by the mechanical engineer.

3.3 AUXILIARY EQUIPMENT

A. Wiring Installation Methods:
   1. General:
      a. At a minimum, install systems and materials in accordance with manufacturer's instructions, rough in drawings and equipment details.
      b. Install electrical components in compliance with requirements of applicable Sections of Division 26.
      c. Install all control wiring 50 volts and above in conduit.
   2. Installation:
      a. All control wiring shall be installed in a neat and workmanlike manner parallel to building lines, with adequate support and shall be supported from or anchored to structural members.
      b. Conduit supported from or anchored to piping, duct supports, the ceiling suspension system, or other electrical conduits are not acceptable.
      c. Wiring buried in slab on grade concrete or explosion proof areas shall be in rigid metal conduit.
      d. Provide adequate strain relief for all field terminations.
      e. Varistors shall be installed on the control side of all output relays and on both sides of the transformers.
      f. All terminations shall be neat with no stray strands.
      g. An additional number of spare wires shall be included in each run as determined by the university for future use.

B. Identification:
   1. General
      a. Verify label nomenclature with the university before engraving or printing.
      b. All control equipment shall be individually and clearly identified by control shop drawing designation:
      c. Paper labels are not acceptable.
   2. Control Panels
      a. Provide engraved Bakelite or lithographed metal nameplates with panel number and system served
      b. Utilize white ½ inch high letters on a black background.
      c. Embossed labels are not acceptable
   3. Component sub-panels – metal tags or laser printed, adhesive backed, metallized polyester film labels.
   4. Control valves and damper actuators – brass tags or engraved Bakelite tags.
   5. Other remote control devices – metal tags or laser printed, adhesive backed, metallized polyester film labels.
   6. Control Conduit Junction Boxes – Painted with a Blue/Green stripe.
   7. Label room temperature sensors with point name and address of the terminal controller served by the sensor.
   8. For all control devices located above the ceiling attach an additional label to the ceiling "T" frame with pop rivets. Use engraved nameplates, 3"x1", black lettering on white background.
   9. Number-code conductors and pneumatic tubing appropriately for future identification and servicing of control system. Reflect this tagging or color coding system on the Project Record Documents

END OF SECTION 23 09 13

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 – GENERAL

A. Sequences for the chilled water system shall conform to the university Metering Standard.

B. Normal (Power Fail) positions for dampers and valves are as follows:
   1. Chiller – Chilled Water Isolation Valves: Fail to Last Position (FLP)

1.3 STANDARD POINTS LIST

A. General
   1. Simulated analog outputs such as tri-state digital output pairs or pulse width modulation shall not be allowed except in dedicated controllers.
   2. Fan and pump status inputs shall be independent current switches, not contacts, on any VFD.
   3. Alarm priorities are a starting point and can be adjusted by the university after project commissioning.
   4. All VFDs shall have an RS485 communications port compatible with the BAS. Speed control, VFD speed, Fan start/stop, and VFD alarm points can be through this port.
   5. Priorities 1 or 2 shall be set up to call the alpha numeric pagers.
   6. This standard points list is a minimum only. The Engineer and BAS controls contractor are responsible for providing a complete BAS system.
   7. VFDs to show actual speed and if in hand,
   8. Fire alarm and trouble for each building.
   9. Operable windows – closed.
   10. High condensate tank level.
   11. Fire pump and jockey pump status

B. Point Lists

Typical Physical Points - Chilled water system fed from the CUP		
Subpoint Name	Type	Description
SEC-DP	LAI	SEC CHW DP
CHWB	LAI	PRI CHW BYP TEMP
CHWR	LAI	PRI CHW RET TEMP
CHWRV1	LAO	PRI CHW RET VALVE
CHWRV2	LAO	PRI CHW RET VALVE
CHWS	LAI	PRI CHW SUP TEMP
PRI-DP	LAI	PRI CHW DP MAIN
FLW	LAI	PRI CHW FLOW
ALM	LDI	CHW VFD ALARM (PUMP #1)
ENA	LDO/LDI	CHW VFD ENA (PUMP #1)
HND	LDI	CHW VFD HOA (PUMP #1)
HZ	LAI	CHW VFD HERTZ (PUMP #1)
LDI	LDI	CHW VFD LDI (PUMP #1)
LDO	LDO	CHW VFD LDO (PUMP #1)
SPD	LAO	CHW VFD SPEED (PUMP #1)
ALM	LDI	CHW VFD ALARM (PUMP #2)
ENA	LDO/LDI	CHW VFD ENA (PUMP #2)
HND	LDI	CHW VFD HOA (PUMP #2)
HZ	LAI	CHW VFD HERTZ (PUMP #2)
LDI	LDI	CHW VFD LDI (PUMP #2)
LDO	LDO	CHW VFD LDO (PUMP #2)
SPD	LAO	CHW VFD SPEED (PUMP #2)
CHWR	LAI	SEC CHW RET TEMP
CHWS	LAI	SEC CHW SUP TEMP
FLW	LAI	SEC CHW FLOW

1.4 SEQUENCE OF OPERATIONS

A. Secondary Chilled Water – Control Sequence

1. Chilled water pumps shall function in normal power mode. One pump (lowest run time) shall be functional in emergency power mode. Emergency power is limited, so BAS shall not allow other pumps to run.
2. Space cooling shall be provided via circulation of chilled water as provided by chilled water from central plant. Chilled water pumps are designed to as a parallel pumping system (n+1 redundancy).
3. Each chilled water pump is to have a hand-off auto (h-o-a) switch; units shall be in auto position when available for operation as controlled by the BAS.
4. The chilled water system shall operate at all times.
5. BAS shall alternate pumps weekly on Tuesday at 11:00 am based upon runtime, sequencing equipment in order of least to greatest accumulated yearly runtime, where the lowest runtime unit is indexed as lead/first, and highest runtime unit is indexed as lag/standby.
6. If units selected as duty pumps are unavailable for operation due to maintenance, failure, or selection of off position at unit (h-o-a) switch, the standby pump shall become one of the duty pumps.
7. During low water flow conditions, the large pumps shall be sequenced off and the smaller pump shall be energized to maintain required flow and temperature drop across the heat exchanger.
8. Upon failure of one of the duty chilled water pump, the BAS shall automatically initiate the startup of the standby pump, and signal an alarm to the bas.
9. Chilled water pump flow shall be maintained continuously.
10. Each pump shall be provided with a current sensor to operate as a flow proof of that pumping unit. Any pump energized through the EMS system which does not give positive indication of flow shall signal an alarm after 90 seconds. Continued lack of flow proof for an energized pump to a period of 180 seconds shall de-energize that pump and initiate the startup of the standby unit.
11. Two differential pressure sensors will provide input to the BAS. Each sensor shall have an adjustable set point (provided by TAB contractor). The BAS shall modulate the VFD's of both duty pumps to maintain dp setpoint for both sensors by calculating the difference between each sensor and its set point. The maximum difference shall be input into the VFD control loop.
12. Modulate the 1/3 and 2/3 two way control valves in sequence in the CUP chilled water return line to maintain a CUP CHWR flow set point measured at the chilled water meter. The CUP CHWR flow set point is varied to maintain the required the bldg CHWS temperature set point. Max flow shall be 2700 gpm (adj.) And min flow shall be 25 gpm (adj.).
13. Bldg CHWS temperature is modulated to maintain CUP CHWR temperature set point. Max set point shall be 47°F.
14. Return water temperature set point shall be 56°F (adj.) Or 0.1°F less than bldg CHWR temperature, whichever is greater. CUP CHWR temperature may float below 56°F in order to maintain the bldg CHWS maximum set point of 47°F.
15. In addition to the components and sequences described, provide an independent campus plant chilled water metering system. System shall consist of TC contractor provided chilled water flow meter, temperature transmitters and BTU totalizing meter.
16. Energize pony chilled water pump at low load conditions.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 SEQUENCE PROGRAMMING

A. Sequence logic shall be installed in a professional manor that demonstrates a full understanding of the sequence and maximizes energy conservation and smooth operation in strategies and techniques not covered by the sequence.

B. All setpoints and control parameters shall be adjustable

C. All control loops shall utilize PID control algorithms unless application dictates otherwise.
   1. The proportional and integral values which make up the PID output value shall be readable and modifiable to facilitate tuning of control loops.
   2. All PID loops serving critical equipment shall provide for operator control of loop starting point without program editing when control is returned to program control after being in operator control.
   3. All loops shall have a virtual output in the loop statement to allow knowledge of loop performance before changing output from manual to program control.

D. The outside air temperature sensor and other inputs that are used in multiple programs shall be attached to a single virtual point, which is used in the programs.

E. Mode changes shall be stable. Abrupt changes that cause unnecessary opening of valves should not be used. Example: Do not abruptly change the supply air temperature setpoint when going from warmup mode to occupied mode.

F. All logic statements or blocks shall be input with consistent naming conventions.

G. The logic for separate DDC controllers serving AHUs with identical sequences of operation, shall also be identical.

3.2 INSTALLATION GENERAL

A. All HVAC safeties shall be hardwired such that the shutdown will occur in Automatic and Hand and bypass modes at the BAS system and the starter.

B. Software safeties are not acceptable (exception: smoke control may be done through software if the control system is UL listed for smoke control).

END OF SECTION 23 09 93

SECTION 23 21 00 - HYDRONIC SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Design piping systems with drain valves at low points of piping, bases of vertical risers, and at equipment.

B. In hydronic systems subject to freezing provide Dowfrost solution or pumped coils.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Valves:
      a. Automatic Fill Valves:
         1) ITT Bell and Gossett, Model B7-12
         2) Amtrol, Model 11F

2.2 MATERIALS, GENERAL

A. Piping and Fittings:
   1. General: Working pressure and temperature maximums, 125 psi and 250 degrees F; water service.
   2. Copper Pipe: ASTM B88-96, copper tubing, hard drawn, Type K for underground lines and Type L for above ground lines.
      a. Fittings: ASME B16.22-95, wrought copper solder joint.
      b. Joining Material:
         1) Solder: ASTM B32-96, 95-5 tin-antimony solder for above ground lines.
         2) Brazing: AWS A5.8-92, Classification BAg 1 (silver) for underground lines and where copper pipe is connected to brass.
      c. Unions: ASME B16.22-95. Wrought copper solder joint, ground seat.
      d. Flanges: Class 125, cast iron or cast bronze flanges.
         1) Bolts and Nuts: ASME B18.2.1-96, carbon steel square head machine bolts with galvanized heavy hex nuts.
         2) Gaskets: ASME B16.21-92, nonmetallic, flat, 1/16-inch, full faced, for water service.
      e. Dielectric Connections: Fittings having insulating material isolating joined dissimilar metals.
         1) Dielectric Waterway Fittings: 175 psi minimum working pressure, ends to match connections.
         2) Flanges: Class 125, cast bronze, ASME Standard, with bolt insulators, dielectric gasket, bolts, and nuts.
   3. Steel Pipe: ASTM A53-96, Schedule 40, seamless black steel pipe.
      a. Fittings:
         1) Threaded: ASME B16.4-92, Class 125, cast iron, or ASME B16.3-92, Class 150, malleable-iron. Standard pattern for threaded joints. Threads shall conform to ASME B1.20.1-83.
         2) Flanged: ASME B16.1-89, Class 125, cast iron, raised ground face, bolt holes spot faced.
         3) Welded: ASTM A234-96, standard weight, butt weld, black iron.
         4) Grooved Couplings and Mechanical Fittings: ASTM A536-84 ductile or ASTM A47-90 malleable iron, with enamel finish and grooves or shoulders designed to

accept grooved couplings. Synthetic-rubber gasket, with central-cavity, pressure-responsive design, and ASTM A183-83 carbon-steel bolts and nuts.

b. Unions: ASME B16.39-86, malleable-iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.

c. Dielectric Waterway Fittings : Threaded end connections. Install to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

B. Valves:

1. Safety Relief Valves:

a. Brass or bronze body with brass and rubber, wetted, internal working parts. Valves designed, built, rated, and stamped in accordance with ASME.

2. Automatic Fill Valve: Diaphragm operated, cast brass body, fill valve designed to maintain water pressure in a closed water system. Valves shall include cleanable strainer, removable seat assembly, and built-in check valve. Valves shall have factory setting of 12 psig with field adjustment range of 10 - 25 psig. Maximum operating temperature shall be 225 degrees F, maximum working pressure of 125 psig. Valve shall have 3/4-inch inlet and outlet.

C. Piping Accessories:

1. Drain Pans: Minimum 18-gauge stainless steel, reinforced to support weight of drain pan and water.

D. Expansion Loop Guides:

1. Factory fabricated cast steel, consisting of bolted two-section outer cylinder and base. Provide two-section alignment guide spider that bolts tightly to pipe.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Copper Pipe:

1. Install Type L copper pipe with wrought copper fittings and solder joints for 2-inch and smaller pipe, above ground, within building.

2. Install Type K copper pipe for 2 inch and smaller pipe below ground.

B. Steel Pipe:

1. Threaded Joints: Install steel pipe with threaded joints and fittings for 2-inch and smaller in exposed locations such as mechanical rooms.

2. Welded and Flanged Joints: Install welded fittings on pipe 2-1/2 inches and larger.

3. Grooved Couplings and Mechanical Fittings: Install mechanical grooved end pipe on condenser water piping.

C. Arrange piping in horizontal groups, each group to be in one plane. Maintain indicated slope. Conceal pipe installations in walls, pipe chases, utility spaces, mechanical rooms, above ceilings, below grade or floors.

D. Install piping in accordance with the stipulations in Section 01040..

E. Sloping, Air Venting, and Draining:

1. Install piping true to line and grade, and free of traps and air pockets. Slope piping up in direction of flow at 0.2 percent grade.

2. Provide eccentric reducers for changes in horizontal piping, top side flat.

3. Connect branch piping to bottom of mains, except for up-feed risers which shall have take-off out top of main.

4. Install manual air vents at high points in hydronic piping systems and at coils other than air handling units. Provide 1/4-inch copper, 180-degree bend pipe to discharge vented water into can.

5. Install automatic air vent on air separator, water coils at air handling units, and where shown. Provide valved inlet and discharge piped to floor drain.

6. Install drain valves with hose adapters at low points in mains, risers, and branch lines. Drain shall consist of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded nipple and cap. Provide drain valves for float type controllers.

F. Fittings: Standard manufactured fittings. Field fabricated fittings and bushings are prohibited on all piping.

G. Unions: Install unions in pipes 2-inch and smaller, adjacent to each valve, at final connections of each piece of equipment and elsewhere to permit alterations and repairs. Install dielectric waterway fittings to join dissimilar metals. Unions are not required on flanged devices.

H. Flanges: Install flanges on valves and equipment having 2-1/2-inch and larger connections.

I. Pipe Ends: Cut pipes, remove burrs and prepare ends with full inside diameter.

J. Joints:
1. Threaded Joints: Apply Teflon tape to male equipment threads. Do not use pipe with threads which are corroded or damaged.
2. Soldered Joints: Comply with procedures contained in AWS Soldering Manual-98. Clean surfaces to be joined of oil, grease, rust, and oxides. Clean socket of fitting and end of pipe with emery cloth. After cleaning and before assembly or heating, apply flux to joint surface and spread evenly.

K. Keep openings in piping closed during construction to prevent entrance of foreign matter.

L. Install stainless steel flexible connectors at inlet and discharge connections to base-mounted pumps and other vibration producing equipment.

M. Valves:
1. Field check valves for packing and lubricant. Replace leaking packing. Service valves with lubricant for smooth and proper operation before placing in service.
2. Install valves accessible from floor level, located for easy access. Install valves in horizontal piping with stem at or above center of pipe. Install valves in position to allow full stem movement. Provide operating handles for valves and cocks without integral operators.
3. Provide extended valve stems where insulation is specified.
4. Provide separate support where necessary.
5. Where soldered end connections are used for valves, use solder having a melting point below 840 degrees F for gate, globe, and check valves; below 421 degrees F for ball valves.
6. Provide valves same size as line size.
7. Provide gate blow-down valves and hose adapters at strainers; same size as strainer blow-off connection.
8. Provide mechanical actuators with chain operators where valves 2-1/2 inches and larger are mounted more than 6 feet above the floor. Extend chains to elevation of 5 feet above floor.
9. Check Valves: Install wafer or lift check valves on pump discharge. Install check valves for proper direction of flow as follows:
   a. Swing Check Valve: Horizontal position with hinge pin level.
   b. Wafer Check Valve: Horizontal or vertical position, between flanges.
   c. Lift Check Valves: With stem upright and plumb.

N. Equipment Piping:
1. Provide combination balancing and shutoff valves to regulate water flow through piping, coils, and at other equipment and piping where shown or required for proportioning flow.
2. Install automatic fill valve in cold water make-up to boilers and chillers. Install three-valve bypass with globe valve around automatic fill valve for quick filling system. Install backflow preventers upstream of fill valve and bypass.

3.2 TESTING, CLEANING AND CERTIFICATION

A. Test piping systems using ambient temperature water, except where there is risk of damage due to

freezing.

B. Release trapped air while filling system using vents at high points. Use drains installed at low points for complete removal of liquid.

C. Isolate equipment and parts that cannot withstand test pressures.

D. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test.

E. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components and repeat hydrostatic test until there are no leaks.

F. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.

G. Mark calibrated name plates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

H. Prepare written report of testing, indicating locations of leaks corrected, method used to correct leaks, number of tests required, and certification that system is leak free.

END OF SECTION 23 21 00

SECTION 23 21 13 - PRE-INSULATED PIPING

PART 1 - GENERAL

1.1 QUALIFICATIONS

A. The system supplier for preinsulated piping systems shall have fabricated systems of the composition defined herein for at least five years.

B. Acceptable Manufacturers:
1. Perma-Pipe/Ricwil
2. Thermacor Process Incorporated

PART 2 - PRODUCTS

2.1 PREINSULATED PIPING SYSTEM – CHILLED WATER SUPPLY AND RETURN

A. General Description:
1. Preinsulated piping systems shall be provided for all underground chilled water piping.
2. A preinsulated piping system consists of carrier pipe, insulation, protective jacket, connectors, supports, and appropriate fittings.
3. All underground chilled water pipes with fluid temperatures up to 60 degrees shall utilize polyurethane foam insulation with HDPE jacketing.
4. All straight sections, fittings, anchors and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. One square cut, plain end for field cutting and beveling is allowed per straight run of pipe. Other ends shall be factory square cut and factory beveled such that the field welds have the capability of being welded to pass x-ray testing.
5. Each system layout shall be computer analyzed by the piping system manufacturer to determine stresses, anchor forces, heat losses, and anticipated movements of the service pipe along the entire length of pipe. The conditions for analysis are as follows: installation temperature of 0ºF, ambient temperature of 50ºF, depth of soil cover is 10 feet, soil conductivity of 10.00 btu-in/sq.ft H-F, and a service line operating temperature of 48ºF. Friction between the ground and the jacketing material must be taken into account for the anchor force and stress calculations.
6. The system design shall be in strict conformance with ASME/ANSI B31.1, latest edition, and stamped by a registered professional engineer.

B. Service Pipe:
1. Internal piping shall be ASTM A-53, Grade B, ERW carbon steal. Schedule 40 for sizes through 10 inch, 0.375-inch wall thickness for sizes 12 inch and over (standard). Domestically produced pipe is required.
2. All joints shall be butt-welded for sizes 2-1/2 inches and larger, and socket welded for 2 inches and smaller.
3. Where possible, straight sections shall be supplied in35+foot double random lengths with sufficient piping exposed at each end for field joint welding and fabrication.

C. Accessories:
1. End seals, fittings and anchors shall be designed and factory fabricated to prevent the ingress of moisture into the system during shipping, outdoor storage, installation, and operation. End caps on the ends of the service pipe are required to prevent debris from entering the pipe for the period of time up until installation.

D. Insulation:

1. Service pipe insulation (polyurethane foam) for straight sections shall be spray applied or injected such that the final foam product has a nominal 2-3 pound per cubic foot density, 90% minimum closed cell content, conforms to ASTM C-591, and has an initial K factor less than or equal to 0.16. Performed polyurethane foam for fittings is acceptable.
2. To ensure no voids are present, all insulation shall be inspected by one of the following two methods: visually checked prior to application of the protective jacket, infrared inspection of the entire length during the foaming process. After successful completion of testing, all test report documents shall be submitted to the university for records.
3. The insulation shall be applied to the minimum thickness specified below. The insulation thickness shall not be less than indicated in these specifications.

Nominal Pipe Size	Insulation Thickness
<14”	1”
14”+	1-1/2”

E. Protective Jacket:
1. All straight sections of the factory preinsulated piping system shall be jacketed with a High Density Polyethylene jacket conforming to ASTM D1248. PVC jackets shall not be allowed.
2. All HDPE jacketing material shall have minimum wall thickness as specified below. The wall thickness shall not be less than indicated in these specifications.

Jacket O.D.	Jacket Thickness
O.D. < 12”	0.125”
12”, O.D.< 24”	0.150”
O.D.>24”	0.175”

3. All fittings of the factory preinsulated piping system shall be jacketed with the same material used for the straight sections of pipe and prefabricated to minimize field joints. Fittings shall be jacketed using a molded HDPE cover over polyurethane foam. Fittings shall be waterproof from the factory without the use of any type of tape, cellophane (or other non-HDPE plastic) wrap, mastic, glue, or hot air welds.

F. Field Joints:
1. All field joints shall be made in straight sections of pipe. Field joints other than at straight sections shall not be acceptable.
2. The method of field joint closure is as follows:
   1) The field joints are pressure tested and inspected for leaks.
   2) A split sleeve with holes in the top is placed around the joint area and secured with straps and sealed to the jacket with tape.
   3) Two-part polyurethane foam is mixed properly and poured into the holes on the top of the split sleeve.
   4) After the foam insulation has expanded and cured, any excess foam shall be removed.
   5) An adhesive backed heat shrinkable sleeve is then placed around the field joint area making sure to overlap the sleeve onto the HDPE jacketing by at least 3” on each side. This 3” overlap is to be completely on the HDPE and does not include the length of overlap of the split sleeve or tape.
   6) Heat is applied using a rosebud torch to the heat shrinkable sleeve slowly and evenly across the length of the sleeve until the sleeve has drawn tight.
   7) Any spots that pucker up during the shrinking process shall be covered with a thick-bodied asphaltic mastic (black roofing compound).
   8) Backfilling of the trench shall not begin until the area has cooled to the touch.
3. The piping systems manufacturer shall furnish all the foam insulation, split sleeves, and heat shrinkable jacketing materials for making the field joints. The contractor shall furnish the straps, tape, knives, saws, torch, gas, and mastic materials.

2.2 PREINSULATED PIPING SYSTEMS – STEAM CONDENSATE RETURN

A. General Description:

1. Preinsulated piping system shall be provided for all underground steam condensate piping.
2. A preinsulated piping system consists of carrier pipe, insulation, protective jacket, connectors, supports, and appropriate fittings.
3. All underground steam condensate return pipes with fluid temperatures up to 200 degrees shall utilize polyurethane foam insulation with HDPE jacketing.
4. All straight sections, fittings, anchors and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. One square cut, plain end for field cutting and believing is allowed per straight run of pipe. Other ends shall be factory square cut and factory beveled such that the field welds have the capability of being welded to pass x-ray testing.
5. Each system layout shall be computer analyzed by the piping systems manufacturer to determine stresses, anchor forces, heat losses, and anticipated movements of the service pipe along the entire length of pipe. The conditions for analysis are as follows: installation temperature of 0ºF, ambient temperature of 50ºF, depth of soil cover is 10 feet, soil conductivity of 10.00 btu-in/sq.ft H-F, and a service line operating temperature of 200ºF. Friction between the ground and the jacketing material must be taken into account for the anchor force and stress calculations.
6. The system design shall be in strict conformance with ASME/ANSI B31.1, latest edition, and stamped by a registered professional engineer.

B. Service Pipe:
1. Internal piping shall be ASTM A-53, Grade B, ERW seamless carbon steel. Schedule 80 for sizes through 8 inch, 0.500-inch wall thickness for sizes 10 inches and over (extra strong). Domestically produced pipe is required.
2. All joints shall be butt-welded for sizes 2-1/2 inches and larger, and socket welded for 2 inches and smaller.
3. Where possible, straight sections shall be supplied in 35+ foot double random lengths with sufficient piping exposed at each end for field joint welding and fabrication.

C. Accessories:
1. End seals, fittings and anchors shall be designed and factory fabricated to prevent the ingress of moisture into the system during shipping, outdoor storage, installation and operation. End caps on the ends of the service pipe are required to prevent debris from entering the pipe for the period of time up until installation.

D. Insulation:
1. Service pipe insulation (polyurethane foam) for straight sections shall be spray applied or injected such that the final foam product has a nominal 2-3 pound per cubic foot density, 90% minimum closed cell content, conforms to ASTM C-591, and has an initial K factor less than or equal to 0.16. Preformed polyurethane foam for fittings is acceptable.
2. To ensure no voids are present, all insulation shall be inspected by one of the following two methods: visually checked prior to application of the protective jacket, infrared inspection of the entire length during the foaming process. After successful completion of testing, all test report documents shall be submitted to the university for records.
3. The insulation shall be applied to the minimum thickness specified below. The insulation thickness shall not be less than indicated in these specifications.

Nominal Pipe Size	Insulation Thickness
< 8”	1-1/2”
10”+	2”

E. Protective Jacket:
1. All straight sections of the factory preinsulated piping system shall be jacketed with a High Density Polyethylene jacket conforming to ASTM D1248. PVC jackets shall not be allowed.
2. All HDPE jacketing material shall have minimum wall thickness as specified below. The wall thickness shall not be less than indicated in these specifications.

Jacket O.D.	Jacket Thickness
O.D. < 12”	0.125”

12”<O.D.<24”	0.150”
O.D.>24”	0.175”

3. All fittings of the factory preinsulated piping system shall be jacketed with the same material used for the straight sections of pipe and prefabricated to minimize field joints. Fittings shall be jacketed using a molded HDPE cover over polyurethane foam. Fittings shall be waterproof from the factory without the use of any type of tape, cellophane (or other non-HDPE plastic) wrap, mastic, glue or hot air welds.

F. Field Joints:
1. All field joints shall be made in straight sections of pipe. Field joints other than at straight sections shall not be acceptable.
2. The method of field joint closure is as follows:
   a. The field joints are pressure tested and inspected for leaks.
   b. A split sleeve with holes in the top is placed around the joint area and secured with straps and sealed to the jacket with tape.
   c. Two-part polyurethane foam is mixed properly and poured into holes on the top of the split sleeve.
   d. After the foam insulation has expanded and cured, any excess foam shall be removed.
   e. An adhesive backed heat shrinkable sleeve is then placed around the field joint area making sure to overlap the sleeve onto the HDPE jacketing by at least 3” on each side. This 3” overlap is to be completely on the HDPE and does not include the length of overlap of the split sleeve of tape.
   f. Heat is applied using a rosebud torch to the heat shrinkable sleeve slowly and evenly across the length of the sleeve until the sleeve has drawn tight.
   g. Any spots that pucker up during the shrinking process shall be covered with a thick-bodied asphaltic mastic (black roofing compound).
   h. Backfilling of the trench shall not begin until the area has cooled to the touch.
3. The piping systems manufacturer shall furnish all the foam insulation, split sleeves, and heat shrinkable jacketing materials for making the field joints. The contractor shall furnish the straps, tape, knives, saws, torch, gas, and mastic materials.

2.3 PREINSULATED PIPING SYSTEMS-STEAM

A. General Description:
1. Preinsulated piping systems shall be provided for all underground steam piping.
2. A preinsulated piping system consists of carrier pipe, carrier pipe insulation, steel casing pipe, casing pipe insulation, HDPE casing pipe insulation protective jacket, connectors, supports, internal moment guides, and appropriate fittings.
3. All underground steam distribution pipes with fluid temperatures up to 355ºF shall utilize mineral wool carrier pipe insulation, steel conduit, and polyurethane foam conduit insulation with HDPE jacketing.
4. All straight sections, fittings, anchors and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. One square cut, plain end for field cutting and beveling is allowed per straight run of pipe. Other ends shall be factory square cut and factory beveled such that the field welds have the capability of being welded to pass x-ray testing.
5. Each system layout shall be computer analyzed by the piping system manufacturer to determine stresses, anchor forces, heat losses, conduit/polyurethane insulation interface temperature, and anticipated movements of the service pipe and conduit along the entire length of pipe. The conditions for analysis are as follows: installation temperature of 0ºF, ambient temperature of 50º F, depth of soil cover is 10 feet, soil conductivity of 10.00 btu-in/sq.ft H-F, and a service line operating temperature of 355ºF. Friction between the ground and the jacketing material must be taken into account for the anchor force and stress calculations.
6. The system design shall be in strict conformance with ASME/ANSI B31.1, latest edition, and stamped by a registered professional engineer.

B. Service Pipe:
1. Internal piping shall be ASTM A-53, Grade B, ERW Carbon steel. Schedule 40 for sizes through 10 inch, 0.375-inch wall thickness for sizes 12 inches and over (standard). Coated pipe is not acceptable. Domestically produced pipe is required.
2. All joints shall be butt-welded for sizes 2-1/2 inches and larger, and socket welded for 2 inches and smaller.
3. Where possible, straight sections shall be supplied in 35+ foot double random lengths with sufficient piping exposed at each end for field joint welding and fabrication.

C. Subassemblies:
1. End seals, gland seals, internal moment guides, fittings (tees and elbows), and anchors shall be designed and factory fabricated to prevent the ingress of moisture into the system during shipping, outdoor storage, installation, and operation. End caps on the ends of the service pipe are required to prevent debris from entering the pipe for the period of time up until installation.
2. All subassemblies shall be designed to allow for complete draining and drying of the conduit system.

D. Service Pipe Insulation:
1. Carrier pipe insulation shall be mineral wool in non-supported sections. Split insulation shall be held in place by stainless steel bands installed on 18 inch centers, or two bands per insulation section, whichever is closest together. The insulation shall have passed the most recent boiling tests and other requirements specified in the Federal Agency Guidelines.
2. Support/guide sections shall have calcium silicate of the same thickness as the mineral wool with a protective sheet metal sleeve attached to the calcium silicate with screws.
3. The minimum insulation thickness shall not be less than indicated in these specifications.

Nominal Pipe Size	Minimum Insulation Thickness
2”-4”	1.5”
6”-10”	2.0”
12”-14”	2.5”
16”-20”	3.0”

E. Outer Conduit:
1. The steel conduit casing shall be a smooth wall, welded steel conduit of the thick nesses specified below:

Nominal Conduit Size	Minimum Conduit Thickness
6”-26”	10 Gauge (0.1345”)
28”-36”	6 Gauge (0.1943”)
38”-42”	4 Gauge (0.2242”)

2. Changes in casing size, as required to allow for carrier pipe expansion into the conduit, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage of the conduit along the entire length of pipe.

F. Pipe Supports and Guides:
1. All pipes within the outer casing shall be supported at not more than 10-foot intervals.
2. The supports shall be designed to allow for continuous airflow and drainage of the conduit.
3. The carrier pipe supports in straight runs shall be designed to occupy not more than 10% of the annular air space between the carrier pipe insulation and the steel conduit.
4. Supports shall be of the type where insulation thermally isolates the carrier pipe from the outer conduit. Support/guide sections shall have calcium silicate of the same thickness as the mineral wool with a protective sheet metal sleeve attached to the calcium silicate with screws. This sleeve shall be as long as the corrugated supports, with a minimum length of 12 inches.
5. The corrugated metal supports shall be a minimum of 12” long and of sufficient strength (thickness) to support the pipe without the annular air space being encroached upon.

6. Moment guides and rotational arrestors internal to the outer conduit shall be provided on the locations shown on the drawings and additionally where requires by the manufacturer's analysis.

G. Outer Conduit Insulation:
1. Outer conduit insulation (polyurethane foam) for straight sections shall be spray applied or injected such that the final foam product has a nominal 2-3 pound per cubic foot density, 90% minimum closed sell content, conforms to ASRM C-591, and has an initial K factor less than or equal to 0.16. Preformed polyurethane foam for fittings (elbows and tees) is acceptable.
2. To ensure no voids are present, all insulation shall be inspected by one of the following two methods: visually checked prior to application of the protective jacket, infrared inspection of the entire length during the foaming process. After successful completion of testing, all test report documents shall be submitted to the university for records.
3. The insulation shall be applied to the minimum thickness of 1-1/2 inches. The insulation thickness shall not be less than indicated in these specifications.

H. Protective Jacket
1. All straight sections of the factory preinsulated piping system shall be jacketed with a High Density Polyethylene jacket conforming to ASTM D1248. PVC jackets shall not be allowed.
2. All fittings of the factory preinsulated piping system shall be jacketed with the same material used for the straight sections of pipe and prefabricated to minimize field joints. Fittings shall be jacketed using a molded HDPE cover over polyurethane foam. Fittings shall be waterproof from the factory without the use of any type of tape, cellophane (or other non-HDPE plastic) wrap, mastic, glue, or hot air welds.
3. All HDPE jacketing material shall have minimum wall thickness as specified below. The wall thickness shall not be less than indicated in these specifications.

Jacket O.D.	Jacket Thickness
O.D.<12”	0.125”
12”<O.D.<24”	0.150”
O.D.>24”	0.175”

I. Field Joints
1. All field joints shall be made in straight sections of pipe. Field joints other than at straight sections shall not be acceptable.
2. The method of field joint closure is as follows:
   a. The welds on the carrier pipe field joints are pressure testes and inspected for leaks.
   b. Shipping supports on the ends of the pipe sections are cut off.
   c. Mineral wool insulation (matching the properties of the straight sections) is applied to the joint area and secured in place using stainless steel bands.
   d. A split metal casing is welded to the conduit and each other to form a pressure testable seal around the conduit. This area should allow water to drain freely past the field joint are and not become trapped in a low spot in the conduit.
   e. A split sleeve with holes in the top is placed around the joint area and secured with straps and sealed to the jacket with tape.
   f. Two-part polyurethane foam is mixed properly and poured into the holes on the top of the split sleeve.
   g. After the foam insulation has expanded and cured, any excess foam shall be removed.
   h. An adhesive backed heat shrinkable sleeve is then placed around the field joint area making sure to overlap the sleeve onto the HDPE jacketing by at least 3” on each side. This 3” overlap is to be completely on the HDPE and does not include the length of overlap of the split sleeve or tape.
   i. Heat is applied using a rosebud torch to the heat shrinkable sleeve slowly and evenly across the length of the sleeve until the sleeve has drawn tight.
   j. Any spots that pucker up during the shrinking process shall be covered with a thick-bodied asphaltic mastic (black roofing compound).

k. Backfilling pf the trench shall not begin until the area has cooled to the touch.

3. The piping systems manufacturer shall furnish all the mineral wool and foam insulation materials, split metal casing, stainless steel bands, split sleeves, and heat shrinkable jacketing materials for making the field joints. The contractor shall furnish the straps, tape, knives, saws, torch, gas, and mastic materials.

PART 3 - EXECUTION

3.1 PREINSULATED PIPING SYSTEM

A. Installation:

1. Provide the service of a manufacturer's representative to instruct the contractor on the installation procedures of the piping system and to be present on site to assist during critical stages of installation and testing. The representative must be qualified by the piping system manufacturer who's responsibility is to provide Field Technical Assistance (FTA).
2. When the manufacturer's representative is on-site, a report shall be produced consisting of the installation log indicating actually installed conditions, field observations, and pressure test results signed by the manufacturer's representative, the contractor, and the engineer's representative. Include documentation by the manufacturer's representative that the installations in conformance with the manufacturer's recommendations.
3. A minimum of six inches (6") of sand or fine gravel bedding shall be placed all around the pipe in the trench. This bedding/fill shall be hand tamped and compacted around the pipes in six-inch (6") lifts until the fill is six inches (6") above the top of the jacketing material. The remaining height of the trench shall be evenly and continuously backfilled and compacted in uniform six inch (6") lifts with suitable clean excavated soil.
4. The field joints shall be installed as described in each product section.

B. Testing – Chilled Water and Condensate Piping

1. The internal pipe shall be hydrostatically tested to 150 psig or 1-1/2 times the operating pressure, whichever is greater. The hydrostatic test pressure shall be held for no less than one hour. In large diameter pipes, pneumatic testing may be an acceptable alternative (at the discretion of the Engineer and the university). Proper safety precautions and coordination must be completes with the university Health and Safety department before testing is initiated.
2. Testing – Welds
   a. Xray first three welds.
   b. If first three pass, X-ray every 10th weld. If failure, xray previous 2 welds after the 10th weld.
   c. After each x-ray failure, x-ray the next three welds.
   d. All welds beyond first three plus every tenth are at no cost to the university

END OF SECTION 23 21 13

SECTION 23 21 16 - PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Strainers:
1. Place strainers upstream of all regulators, pumps, chillers, boilers, control equipment or any other equipment, which could be damaged or rendered inoperative due to foreign matter in the piping. Provide adequate access for removal.
2. Provide parallel strainers with isolation valves on primary piping systems where operation is critical and is intended to continue during servicing. Strainers shall then be cleaned through removable caps.
3. For critical systems, provide pressure gauges to indicate loading. Consider clear see-through duplex strainers or filters for critical applications.
4. Provide single strainers with isolation valves on secondary piping systems where operation can be interrupted. Provide blowdown valves with caps on single strainers.

B. Hydronic Piping Specialties:
1. General: Provide factory fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, of if not indicated, provide proper selection as determined by installer to comply with connections, within properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

C. General Information - Gauges
1. Provide gauge cocks at all gauges for removal under operation.
2. Employ independent gauges with range twice the operating pressure across pumps, strainers, pressure reducing stations, etc.
3. Monitor all systems by the building automation system for On/Off, temperatures, and pressures.

D. Shall be made in accordance with Section 23 00 00.

1.2 QUALITY ASSURANCE

A. Codes and Standards:
1. FCI Compliance: Test and rate "Y" type strainers in accordance with FCI 73-1 "Pressure Rating Standard for "Y" Type Strainers". Test and rate other type strainers in accordance with FCI 78-1 "Pressure Rating Standard for Pipeline Strainers other than "Y Type".
2. ASME B31.9 "Building Services Piping" for materials, products, and installation.
3. Safety valves and pressure vessels shall bear the appropriate ASME label.
4. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
5. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Air Vents (manual)
   a. Armstrong Machine Works
   b. Bell & Gossett, ITT; Fluid Handling Div.

c. Hoffman Specialty ITT, Fluid Handling Div.
d. Spirax Sarco

2. Pipe Escutcheons:
   a. Chicago Specialty Mfg. Co.
   b. Sanitary-Dash Mfg. Co.
   c. Producers Specialty & Mfg. Corp.
3. Mechanical Sleeve Seal:
   a. Thunderline Corp.
4. Fire and Smoke Barrier Penetration Seal:
   a. Dow Corning
   b. Electrical Products Div./3M
   c. Flame Stop, Inc.
5. Expansion Tanks:
   a. Diaphragm Type Expansion Tanks
      1) Amtrol, Inc.
      2) Watts.
      3) Bell and Gossett ITT; Fluid Handling Div.
6. Air Separators:
   a. Bell and Gossett ITT; Fluid Handling Div.
   b. Amtrol Inc.
   c. Armstrong Pumps, Inc.
   d. Spriax Sarco
7. Combination Pressure and Temperature Relief Valves:
   a. Amtrol, Inc.
   b. Bell and Gossett ITT; Fluid Handling Div.
   c. Watts Regulator Co
   d. Spirax Sarco
8. Low Pressure Strainers:
   a. Metraflex Co.
   b. Hoffman Specialty ITT; Fluid Handling Div.
   c. Watts Regulator Co.
   d. Spirax Sarco
9. Basket Strainers:
   a. R-P&C Valve
   b. Keckley.
   c. Metraflex
10. Pressure Reducing Valves (Water Application):
    a. Amtrol, Inc. Taco, Inc.
    b. Keckley
    c. Armstrong
11. Pump Suction Diffusers:
    a. Amtrol, Inc.
    b. Armstrong Pumps, Inc.
    c. Bell & Gossett ITT; Fluid Handling Div.
12. Diverting Fittings:
    a. Armstrong Pumps, Inc.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Victaulic Company of America
13. Dielectric Waterway Fittings:
    a. America
    b. Epco Sales, Inc.
14. Hydronic System Safety Relief Valve:
    a. Kunkle Valve Co., Inc.
    b. Watts Regulator Co.
    c. Bell & Gossett ITT; Fluid Handling Div.
15. Pressure Regulating Valves (Steam Application):

a. Spence (preferred)
b. Hoffman Specialty ITT; Fluid Div.
c. Armstrong.

2.2 MATERIALS, GENERAL

A. Air Vents (Manual):
1. Bronze body and nonferrous internal parts; 150 psig working pressure, 212 degree F operating temperature; screwdriver or coin operated type.
2. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operation temperature and pressure. With isolating valve.
3. Washer Type: Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.
4. Provide valve or gauge cock for isolation and repair.
5. Pipe high point manual air vents to drain. Notify Project Manager in areas where the manual vents can not be piped to drain.

B. Pipe Escutcheons:
1. General: Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
2. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
3. Pipe Escutcheons for Oversized Holes: Provide sheet steel escutcheons, solid or split hinged.

C. Dielectric Protection:
1. General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.
2. Use dielectric waterway fittings rather than dielectric unions
3. Installing full-port brass valves, with half-unions at the inlet and outlet, to connect steel to copper pipe is acceptable.
4. Dielectric protection fittings shall be installed in equipment rooms only.

D. Sleeves: Provide pipe sleeves of one of the following:
1. Galvanized sheet steel with lock seam joints for sleeves passing through non-load bearing or non-fire rated walls and partitions. Minimum gauges as follows:
a. Pipes 2-1/2 inch and smaller: 24 gauge.
b. Pipes 3 inch to 6 inch: 22 gauge.
c. Pipes over 6 inch: 20 gauge.
2. Schedule 40 galvanized steel pipe or cast iron pipe for sleeves passing through load bearing walls, concrete beams, fire-rated partitions, foundations, footings, and waterproof floors.
3. Insulated Pipe: Sleeves of sufficient internal diameter to install pipe and insulation and allow for free movement of pipe.
4. In finished areas where pipes are exposed, terminate sleeves flush with wall, partitions, and ceiling and extend 1 inches above finished floors.
5. Fire Protection Lines: Extend sleeves a minimum of 3 inches above finished floor.

E. Mechanical Sleeve Seals:
1. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation. Foundation walls only.
2.

F. Fabricated Piping Specialties:
   1. Drip Pans: Fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inch. Reinforce top, either by structural angles or by rolling top over 1/4-inch steel rod. Provide hole, gasket and flange at low point for watertight joint and 1-inch drain line connection.

G. Expansion Tanks:
   1. Compression Tanks: Welded carbon steel rated for 125 psig working pressure, 375 degree F maximum operating temperatures. Provide with taps in bottom of tank for tank fittings and taps in end of tank for gauge glass. Tested and labeled in accordance with ASME Pressure Vessel Code.
      a. Air Control Tank Fittings: Cast iron body, copper-plated tube, brass vent tube plug, and stainless steel ball check.
      b. Tank Drain Fitting: Brass Body, nonferrous internal parts. Fitting to admit air into compression tank drain water, and close off the system.
   2. Diaphragm Type Tanks: Welded steel, rated for 125 psig working pressure, 375 degree maximum operating temperature, flexible diaphragm sealed into tank. Provide taps for pressure gauge, air charging fitting, and drain fitting. Provide with steel legs or saddles. Tested and labeled in accordance with ASME Pressure Vessel Code.

H. Air Separators:
   1. In-line air separators: Cast iron for sizes 1-1/2 inch and smaller, welded steel for sizes 2 inch and larger; tested and labeled for minimum 125 psig working pressure and 350 degree F operating temperature. ASME constructed and labeled
   2. Air Elimination Valve: Bronze, float operated, for 125 psig operating pressure.

I. Pressure Reducing Valves:
   1. Diaphragm operated, cast iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down and non-corrosive valve seat and stem. Factory set at operating pressure and field adjustable.

J. Hydronic System Safety Relief Valves:
   1. Diaphragm operated, cast iron or brass body, Teflon seat, stainless steel stem and springs, with low inlet pressure check valve, inlet strainer removable without system shut-down, ASME certified and labeled. Select valve to suit actual system pressure and BTU capacity. Set valve to relieve at 10 psi above operating pressure.

K. Unions: ANSI B16.39 malleable-iron, Class 150, hexagonal stock, with ball-and- socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.

L. Dielectric waterway fittings: Threaded end connections installed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

M. Automatic Air Vent:
   1. Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240 degree F operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection. B & G Model #87.

N. Pump Suction Diffusers:
   1. Cast iron body, with threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger; 175 psig working pressure, 300 degree F maximum operating temperature; and complete with the following features:
      a. Inlet vanes with length 2-1/2 times pump suction diameter or greater.
      b. Cylinder strainer with 3/16 inch diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head.
      c. Disposable fine mesh strainer to fit over cylinder strainer.

d. Permanent magnet located in flow stream, removable for cleaning.
e. Adjustable foot support designed to carry weight of suction piping.
f. Blowdown tapping in bottom; gauge tapping in side.

O. Diverting Fittings: Cast iron body with threaded ends or wrought copper with solder ends; 125 psig working pressure, 250 degree F maximum operating temperature. Indicate flow direction on fitting.

P. Low Pressure Y-Pattern Strainers:
1. Line size strainer with ends matching piping system materials, 125 psig working pressure with Type 304 stainless steel screens with 3/64-inch perforations at 233 per square inch.
a. Threaded Ends, 2-Inch and Smaller: Cast iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
b. Threaded or Flanged Ends, 2-1/2-inch and Larger: Cast iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
c. Butt Welded Ends, 2-1/2-inch and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
d. Grooved Ends, 2-1/2-inch and Larger: Tee pattern, ductile-iron or malleable-iron body, and access end cap, access coupling with EDPM gasket.

Q. High Pressure Pipeline Strainers:
1. Line size with ends matching piping system materials, 250 psig working pressure with Type 304 stainless steel screens with 3/64-inch perforations at 233 per square inch.
a. Threaded Ends, 2-Inch and Smaller: Cast iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
b. Threaded or Flanged Ends, 2-1/2-inch and Larger: Cast iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
c. Butt Welded Ends, 2-1/2-inch and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
d. 1/2-inch and Larger: Tee pattern, ductile-iron or malleable-iron body, and access end cap, access coupling with EDPM gasket.

R. Basket Strainers:
1. For 125 psig Systems or less and pipe sizes 16-inches or less: High-tensile ASTM A126B Class B cast iron, angle design, ductile iron clamped cover, flanged ends, stainless steel screen assembly, suitable gasket material, bottom threaded drain outlet.
2. For systems operating greater than 125 psig and pipe sizes greater than 16-inches: High-tensile ASTM A126 Class B cast iron, angle design, bolted cover, flanged ends, stainless steel screen assembly, suitable gasket material, bottom threaded drain outlet.

S. Gas Meter:
1. As per local utility supplier.
2. Coordinate any monitoring of meter with 23 09 00.

T. Domestic Water Meter:
1. General: Install per local utility.

U. Vacuum Breakers
1. Armstrong
2. Watts
3. Hoffman+
4. Spirax Sarco

PART 3 - .EXECUTION

3.1 INSTALLATION, GENERAL

A. General:
1. Install specialties in accordance with manufacturer's instructions to provide intended performance.
2. Support tanks inside building from building structure in accordance with manufacturer's instructions.
3. Where large air quantities can accumulate, provide enlarged air collection standpipes.
4. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
5. Provide manual air vents at system high points and as indicated with ¼" X 2" minimum copper tube to direct flow of air and fluid.
6. Provide valved drain and hose connection on strainer blow down connection.
7. Support pump fittings with floor mounted pipe and flange supports.
8. Provide relief valves on pressure tanks, low pressure side or reducing valves, heat exchangers, and expansion tanks.
9. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity.
10. Pipe relief valve outlet to nearest floor drain.
11. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
12. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or sleeve but not to insulation with set screws. Install escutcheon to cover penetration hole and flush with adjoining surface. Provide high cap type escutcheon to clear sleeve extension where sleeve extends above finished surface.
13. Dielectric waterway fittings: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
14. Mechanical Sleeve Seals: at exterior foundation walls only
    a. Installed between sleeve and pipe.
    b. Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

B. Hydronic Specialties Installation:
1. Install automatic air vents where noted.
2. Install in-line air separators in pump suction lines. Run piping to compression tank with 1/4 inch per foot (2%) upward slope towards tank. Install drain valve on units 2 inch and larger.
3. Install ball valve to isolate expansion tank for cleaning and blowdown. Install drain valve on tank for cleaning/blowdown.
4. Install separator in pump suction lines. Run piping to compression tank with 1/4 inch per foot (2%) upward slope towards tank. Install blowdown piping with ball valve, extend to nearest drain.
5. Provide sufficient number of pipe diameters to inlet of each pump as noted in detail or install pump suction diffusers on pump suction inlet, adjust foot support to carry weight of suction piping. Install nipple and ball valve in blowdown connection.
6. Install gauge glass and cocks on end of compression tanks. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
7. Provide adequate support from structure to carry twice the weight of the tank, piping connections, fittings, and weight of water assuming a full tank of water. Do not overload building components and structural members. Coordinate concrete inserts with general contractor.

END OF SECTION 23 21 16

SECTION 23 25 01 - CHEMICAL WATER TREATMENT - START-UP

PART 1 - GENERAL

1.1 SUMMARY

A. This standard includes flushing, cleaning, and treating the following systems:
   1. Flushing, Cleaning, and Treating of water filled systems that interface with the CUP
   2. Flushing, Cleaning, and Treating of water filled systems that do not interface with the CUP

1.2 SYSTEM DESIGN REQUIREMENTS

A. Flushing, Cleaning, and Treating of Systems into the university Distribution System(s).
   1. The university Facilities Operations Department personnel are highly motivated to employ the best possible treatment practices to insure the boilers, chillers and associated piping meet or exceed their expected lifespan. The university Central Utility Plant (CUP) personnel co-ordinates the cleaning process for all Chilled Water, Heating Water, Steam, Condensate, Condenser Water, and Cooling Towers.
   2. Expansion to the distribution system of the university requires the interface of new piping with the existing piping. With this in mind, the university CUP requires that consistent cleaning and passivation practices are performed throughout the campus on all projects. The goal is for all new facilities are as follows:
      a. Insure that all systems are properly flushed, cleaned, and passivated to minimize foulants returned to the CUP when opened to the existing distribution system.
      b. Insure that the treatment practices employed are compatible with current treatment programs.
      c. Insure that pretreatment practices meet the minimum requirement of the university CUP.
   3. Due to the size of the campus chilled water system, creative approaches are being applied to the treated water to manage the inevitable conditions where various contaminants may enter the loop as a result of system expansion. The general goals will be consistent with industry standards for proper treatment of the systems on site. Below is a summary of these standards:
      a. Chilled water mild steel corrosion rates of <0.5 MPY.
      b. Chilled water copper corrosion rates of no greater than 0.1 MPY.
      c. Aerobic biological counts in the chilled water not to exceed 50,000 CFU/ml, sulfate reducing bacteria counts <10 CFUs.
      d. No scale in the chilled water system.
   4. An equivalent chemical may be used after it has been approved for compatibility by the university CUP. The contractor's chemical vendor will provide data sheets to the university CUP with the request for approval for an equivalent chemical. Equivalent chemicals cannot be used until they have been approved by the university CUP.
   5. It is the contractor's responsibility to ensure that the system(s) is clean, and has been properly treated. It is the university Water Treatment contractor's responsibility to verify that the system(s) has been properly treated and is ready to be opened into the university Distribution System(s).
   6. Co-ordinate with the university CUP personnel and the current university CUP Water Treatment contractor to determine which tests and inspections will be monitored.
   7. Contact the university Outage Coordinator to schedule the opening of any/all system(s) into the same university system(s). The university Outage Coordinator must have all required paperwork on file before they will schedule a system startup.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

A. Chilled Water and Heating Water Systems
   1. Chilled water piping must be pre-cleaned and passivated prior to operation. To accomplish this, a method must be provided to circulate these lines at design flow during cleaning. Design minimum flows are stated as a function of pipe diameter in the table below:

Pipe diameter in inches	Cross sectional area in feet	Minimum flow GPM for 2 ft/sec velocity
6	0.2	180
8	0.35	314
12	0.79	708
16	1.4	1256
24	3.14	2818
36	7.06	6284

2. Taps will be installed, in the vault, on the building side of the supply and return isolation valves. The building pump or temporary circulation pump will circulate the water during the pretreatment process.
3. The addition of Isothiazolin biocide is required. It needs to be added after the system cleaning has been accepted. The nitrite must be added 24 hours after the nitrite has been added.
4. During the flushing, cleaning, and treating process, insure that the minimum flow of 2 feet/second is met. Flow less than 2 feet/second is not acceptable. Flows greater than 2 feet/second, up to the maximum design flow of the system, are acceptable and will assist in the flushing, cleaning, and treating process. Maximum flow is preferred but not required.
5. If possible, on heating water systems, heat the bulk water to 120 degrees F during the circulation period.
6. The university CUP must approve all products that will be used prior to the start of the process. Only factory blended products will be considered. Products blended onsite are not allowed.
7. Biological samples can only be taken Monday through Thursday (Holidays excepted). The sample is sent overnight to the lab. Until the test results return acceptable, a system will not be allowed to be opened into the existing university Distribution system.
8. Two options exist for pre-cleaning. One approach is an alkaline based approach and the other is a nitrite based approach. Consult the university CUP prior to choosing an approach. The alkaline based pre-cleaner applies a minimum of 500 ppm of total inorganic phosphate within the treated water. The pre-cleaner should also contain detergents and dispersants designed to perform an effective cleaning at pH values of 11.5 or higher. The pretreatment plan should also include a minimum of 10 ppm of organic copper corrosion inhibitor such as “TT” in the bulk water. An alternative nitrite based approach uses nitrite, detergents, dispersants and 10 ppm of organic copper corrosion inhibitor such as “TT”. This product is applied to achieve nitrite residuals of in excess of 600 ppm as NO2. These treatment levels can be achieved by adding 2.5 gallons of Nalco-2859, or an equivalent product, to the system per 1000 gallons of system capacity.
   a. Flushing, Cleaning, and treating Chilled Water and Heating Water systems using an Alkaline Based Cleaner. Remember that the timeline below is dependent upon all things occurring as they are written. The time line below is bare bones for an average sized system. Smaller projects may be able to save some time during the filling and draining periods.
      1) Day 1: Fill the entire system that is available with city water and continuously circulate the water with one of the system pumps throughout the building, through all chilled water lines, including lines to vaults. If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run.
      2) Day 2 (24 hours after step #1): The university CUP and/or the university Water Treatment contractor, the contactors water treatment vendor, and the contractor to test the water for conductivity and view the water for clarity. If there are no issues,

the university CUP will give a verbal "OK" to the contractor onsite to proceed with the drain down. This "OK" will be followed up with an e-mail to all interested parties.

3) Day 3: Refill the entire system that is available with city water and add the approved alkaline based cleaner. Your water treatment consultant will need to calculate the correct amount of cleaner needed. Circulate the water with one of the system pumps throughout the building, through all chilled water lines, including lines to vaults. If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run. Run each pump at least two separate times.
4) Day 4: Continue to circulate the entire system with the cleaner in it throughout the building, including lines to vaults (If required). If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run. We would like to see each pump to run two separate times.
5) Day 5 (A minimum of 48 hours after step #3 has been completed): The university CUP and/or the university Water Treatment contractor, the contactors water treatment vendor, and the contractor to test water for pH and conductivity. If the pH test is above 11.5 and the conductivity is elevated well above city water conductivity, a verbal "OK" will be given that the pH of the water is acceptable and the drain down and flushing out of the cleaner can start. This "OK" will be followed up with an e-mail to all interested parties.
6) Day 6: If the following does not occur as written, all dates below this will be affected. When the conductivity is within 10% of the conductivity of the City of Aurora water, contact the university CUP. The university CUP will meet with the contactors water treatment vendor and the contractor at the site and test the water for conductivity and pH. If the conductivity test is within 10% of the conductivity of the City of Aurora water, a verbal "OK" will be given that it is acceptable to add the Isothiazolin biocide. Circulate the system for 24 hours and then proceed to step #7. This "OK" will be followed up with an e-mail to all interested parties.
7) Day 7 (24 hours after step #6 has been completed): Add enough of the approved inhibitor (Nitrite) to raise the level of nitrite in the system to a minimum of 600 ppm. Your water treatment consultant will need to calculate the correct amount of chemical needed.
8) Day 9 (A minimum of 48 hours after step #7 has been completed): Contact the university CUP. The university CUP and/or the university Water Treatment contractor will meet with the contactors water treatment vendor and the contractor at the site and test the water for conductivity and nitrite, and a biological sample will be taken and sent overnight to the lab. If the nitrite is at 600 ppm or higher and the conductivity is elevated, a verbal OK of the nitrite level will be given. If the nitrite level is low, a verbal denial will be given and more nitrite will need to be added. Conductivity will be tested to verify that the conductivity is elevated above city water conductivity. A sample for biological testing will be taken and sent overnight to the university Water Treatment contractors testing lab. We encourage you to have you water treatment consultant to have biological testing performed on the water. Ensure that the lab that performs the testing will test for aerobic, anaerobics and denitrifying bacteria.
9) Keep the system flowing until it is opened up to the university Chilled Water Distribution system.
10) When the test results become available, we will share them with all interested parties. If the sample passes the biological tests, proceed to the next step. If the sample fails one or more of the tests, we will need to met as a group and discuss re-cleaning and re-treating of the system.
11) Once the system has successfully passed all tests, schedule with university Outage Coordinator to open the system up to the university Chilled Water Distribution system.

b. Flushing, Cleaning, and treating Chilled Water and Heating Water systems using a Nitrite Based Cleaner. Remember that the timeline below is dependent upon all things occurring as they are written. The time line below is bare bones for an average sized system. Smaller projects may be able to save some time during the filling and draining periods.

1) Day 1: Fill the entire system that is available with city water and continuously circulate the water with one of the system pumps throughout the building, through all chilled water lines, including lines to vaults. If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run.

2) Day 2 (24 hours after step #1): The university CUP and/or the university Water Treatment contractor, the contactors water treatment vendor, and the contractor to test the water for conductivity and view the water for clarity. If there are no issues, the university CUP will give a verbal "OK" to the contractor onsite to proceed with the drain down. This "OK" will be followed up with an e-mail to all interested parties.

3) Day 3: Refill the entire system that is available with city water and add the approved nitrite based cleaner. Circulate the water with one of the system pumps throughout the building, through all chilled water lines, including lines to vaults. If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run. Run each pump two separate times.

4) Day 4: Continue to circulate the entire system with the cleaner in it throughout the building, including lines to vaults (If required). If there is more than one pump in the system, alternate the pumps at least once during this process to ensure each pump is run. We would like to see each pump to run two separate times.

5) Day 5 (A minimum of 48 hours after step #3 has been completed): The university CUP and/or the university Water Treatment contractor, the contactors water treatment vendor, and the contractor to test water for nitrite and conductivity. If the nitrite test is above 600 ppm and the conductivity is elevated above city water conductivity, a verbal "OK" will be given that the nitrite level in the water is acceptable and the bleed/fill of the nitrite based cleaner can start. With the pump still running, open a ¾" drain to a sanitary sewer and start to purge water from the system. At the same time add water to the system to replace the water that is being purged down the drain. Continue to do this until the nitrite level is down to 200 to 300 ppm. 300 ppm is preferred. DO NOT do this bleed/fill if there is nobody to monitor the process. This "OK" will be followed up with an e-mail to all interested parties.

6) Day 6: If the following does not occur as written, all dates below this will be affected. When the nitrite level in the water is between 200 and 300 ppm, contact the university CUP. The university CUP will meet with the contactors water treatment vendor and the contractor at the site and test the water for conductivity and nitrite. If the nitrite is between 200 to 300 ppm, a verbal "OK" will be given that it is acceptable to add the isothiazolin biocide. Circulate the system for 24 hours and then proceed to step #7. This "OK" will be followed up with an e-mail to all interested parties.

7) Day 7 (24 hours after step #6 has been completed): Add enough of the approved inhibitor (Nitrite) to raise the level of nitrite in the system to a minimum of 600 ppm. Your water treatment consultant will need to calculate the correct amount of chemical needed.

8) Day 9 (A minimum of 48 hours after step #7 has been completed): Contact the university CUP and/or the university Water Treatment contractor. The university CUP will meet with the contactors water treatment vendor and the contractor at the site and test the water for conductivity and nitrite, and a biological sample will be taken and sent overnight to the lab. If the nitrite is at 600 ppm or higher and the conductivity is elevated, a verbal OK of the nitrite level will be given. If the nitrite level is low, a verbal denial will be given and more nitrite will need to be added. Conductivity will be tested to verify that the conductivity is elevated above city

water conductivity. A sample for biological testing will be taken and sent overnight to the university Water Treatment contractors testing lab. We encourage you to have you water treatment consultant to have biological testing performed on the water. Ensure that the lab that performs the testing will test for aerobic, anaerobics and denitrifying bacteria.

9) Keep the system flowing until it is opened up to the university Chilled Water Distribution system.

10) When the test results become available, we will share them with all interested parties. If the sample passes the biological tests, proceed to the next step. If the sample fails one or more of the tests, we will need to met as a group and discuss re-cleaning and re-treating of the system.

11) Once the system has successfully passed all tests, schedule with the university Outage Coordinator to open the system up to the university Chilled Water Distribution system.

B. Glycol:

1) Dowfrost

C. An equivalent chemical may be used after it has been approved for compatibility by the university. The contractor's chemical vendor will provide data sheets to the university with the request for approval for an equivalent chemical. Equivalent chemicals cannot be used until they have been approved by the university.

END OF SECTION 23 25 01

SECTION 23 64 16 - CENTRIFUGAL WATER CHILLERS

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Chillers included in this section are intended for structures that are constructed outside the practical limits of the campus central chilled water system or are chillers utilized to provide chilled water for a specific process.

B. Do not locate chillers near noise sensitive areas.

C. Monitor machine room and sound audible alarm if refrigerant concentrations exceed 10 ppm.

D. Compressors over 100 ton Capacity:
1. Motors and Starters:
   a. aDual winding, wye-delta design with matching two-step, closed transition, time-delay starting switch gear is preferred. Provide an auxiliary timer in the starting circuit.
   b. Set timer to limit starts to a minimum of 30 minutes apart or greater.
   c. An auto-transformer with reduced voltage start is an acceptable alternate starter.
   d. Provide heat sensors on all motors in the windings for thermal protection.
2. Full-running Protection:
   a. Specify compressors equipped with high and low pressure safety cut out, external overload protection, thermal protection, and low oil pressure.
   b. Manual reset type safeties which cause an electrical lock-out of the starting circuit when it has tripped, with an indication of which safety device has operated.
3. Gauges and Lubrication:
   a. Include gauges, indicating high side, low side and oil pressures. Gauges are not required if unit is equipped with a micro-processor control which shows pressures at control panel.
   b. Forced-feed lubrication system with filter, cooler, and visual inspection port in the oil reservoir.
4. Heaters:
   a. Provide crankcase heaters wired on a separate electrical circuit.
   b. Provide oil pump starter wired on a separate electrical circuit.
5. Refrigerant Transfer: Provide provisions for pump out/down into unit-mounted receiver if application warrants.
6. Pressure Relief: Show on drawings, safety valve pressure relief piping, vented to outdoors in accordance with ASHRAE 15. Provide self-closing, resealing type pressure relief valve.

E. Compressors of 60 to 100 ton Capacity:
1. Semi-hermetic, reciprocating type, rotary screw, helical rotor or scroll.
2. Full-running Protection:
   a. Specify compressors equipped with high and low pressure safety cut out, external overload protection, thermal protection, and low oil pressure.
   b. Manual reset type safeties which cause an electrical lock-out of the starting circuit when it has tripped, with an indication of which safety device has operated.
3. Include gauges, indicating high side, low side and oil pressures. Gauges are not required if unit is equipped with a micro-processor control which shows pressures at control panel.
4. Crankcase heaters.
5. Oil reservoir sight glass.
6. Replaceable refrigerant filter-dryers in liquid line.
7. Hydraulic capacity control by cylinder unloading for adjustments to load fluctuations.
8. Positive unloaded start.
9. Discharge muffler.
10. Internal vibration isolation.

11. Closed transition starting switch-gear. Part-winding is acceptable.
12. Refrigerant Transfer: Provide provisions for pump out/down into unit-mounted receiver if application warrants. If condenser will hold the full charge, this is an acceptable alternative.

F. Compressors under 60 but over 15 ton capacity:
1. Hermetic or semi-hermetic, reciprocating type, helical rotor or scroll.
2. Inherent thermal overload protection for motors.
3. Include gauges, indicating high side, low side and oil pressures. Gauges are not required if unit is equipped with a micro-processor control which shows pressures at control panel.
4. Crankcase heaters.
5. Oil reservoir sight glass.
6. Replaceable refrigerant filter-dryers in liquid line.
7. Hydraulic capacity control by cylinder unloading or staging of multiple compressors.
8. Positive unloaded start.
9. Discharge muffler.
10. Internal vibration isolation.
11. Closed transition starting switch-gear.
12. Refrigerant Transfer: Provide provisions for pump out/down into unit-mounted receiver if application warrants. If condenser will hold the full charge, this is an acceptable alternative.

G. Compressors between 7-1/2 and 15 ton capacity.
1. Same requirements as 15 to 60 ton compressors except that cylinder unloading and unloaded start features are not required on the small units.

H. Compressors below 7-1/2 tons:
1. Same requirements as 7-1/2 to 15 ton compressors except gauges are not required.

I. Condensers:
1. Select air cooled condensers with sufficient capacity to compensate for altitude deration of 5200 feet and 105 degree F inlet air temperature.
2. Do not specify vertical blow-type condenser fans for systems that operate during winter.
3. For winter operation, specify a horizontal blow-type condenser fan with a weather-protecting shroud designed to prevent possible blade icing and unbalance.
4. Arrange water-cooled condensers so that tubes can be rodded without hindrance from walls, piping, or equipment.
5. Provide low ambient accessory package to consist of variable speed condenser fan control based upon outside air temperature or refrigerant gas temperature/pressure on air-cooled condensers with intermittent winter cooling requirements down to 40 degree F outside air temperature. Provide thermostatic expansion valves with these systems. Orifice type valves are not permitted.
6. Provide flooded condenser control with liquid receiver and 3-way head pressure control valves on systems requiring continuous and critical winter cooling operation.Provide electronic expansion valves.

J. Chillers:
1. Centrifugal chillers with oil coolers, which are cooled with chilled water, should have pressure and temperature gauges installed on inlet outlet of chiller out of the influence of the oil cooler circuit.
2. Install the following components on all chilled and condenser water systems.
   a. Chiller Water Temperature Sensors:
      1) Supply temperature sensor
      2) Return temperature sensor
   b. Low Water Temperature Cut-out.
   c. Water Flow Sensors:
      1) Chiller water system
      2) Condenser water system
   d. Relief Valves.

3. Install noise and vibration apparatus in accordance with state and federal regulations, and ARI Standard 575-87.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Centrifugal or Rotary Screw Chillers:
a. Carrier.
b. McQuay.
c. Trane.
d. York.

2.2 MATERIALS, GENERAL

A. Centrifugal or Rotary Screw Chillers:
1. Chiller performance rated in accordance with latest edition of ARI 550.
2. Factory assembled and wired consisting of one or compressors, an evaporator or cooler, an air or water-cooled condenser, safety controls and operational controls.
3. Refrigerant: R134a; provide full operating charge of refrigerant and oil. Provide refrigerant charging port.
4. Compressor: Hermetic or semi-hermetic, rebuildable.
5. Motor: Refrigerant cooled, hermetic or semi-hermetic motor; or open, drip-proof induction motor; with the following features: Overvoltage protection, Undervoltage protection, Single-phasing protection, Current-overload protection.
6. Evaporator: Shell and tube cooler with refrigerant totally enclosed by shell; water in tubes.
a. Shell: Carbon steel plate.
b. Cooler Tubes: Seamless copper; expanded into tube sheets,; individually replaceable; externally finned.
c. 300 psig refrigerant working pressure.
d. 150 psig water side working pressure
e. Insulation: factory applied, ¾-inch thick, flexible elastomeric insulation evaporator, suction lines, and other surfaces where condensation might occur.
7. Water Cooled Condenser: Shell and tube condenser with water enclosed in tubes; refrigerant enclosed by shell.
a. Shell: Carbon steel plate.
b. Cooler Tubes: Seamless copper; expanded into tube sheets,; individually replaceable; externally finned.
c. 300 psig refrigerant working pressure.
d. 150 psig water side working pressure
e. Safety and operating options include the following; pressure relief safety valve, purge valve, subcooler circuit.
8. Air Cooled Condenser: Factory assembled, wired, and tested; consisting of casing, air-cooled condenser coils, fans, and controls integrated with compressor operation.
a. Casing: Weatherproof, constructed of hot-dip galvanized steel with factory-painted finish.
b. Fans: Propeller type, statically and dynamically balanced; vertical discharge.
c. Fan Motor: Direct drive, weather proof, with bearings permanently lubricated, and having built-in current and thermal overload protection.
d. Condenser Coil: Copper tubes with mechanically bonded aluminum fins.

B. Controls:
1. General: Manufacturer’s standard microprocessor-based chiller controls.
2. Temperature Controls: Modulating slide valve to maintain chilled water temperature set point without hunting within throttling range. Include the following features:
a. Throttling Range: Full load to 10 percent of full load.

b. Chilled water temperature control.
c. Chilled water temperature setback.
d. Load limit controller.

3. HVAC Controls: Furnish appurtenance to monitor and control chilled water set point, to monitor condenser water set point, and to monitor chiller alarms from building automation system.
4. Safety Controls: Automatic and Manual reset controls to perform the following functions:
   a. Low evaporator pressure cutout.
   b. Low chilled water temperature cutout.
   c. Low oil sump temperature cutout.
   d. Low oil pressure cutout.
   e. High oil temperature cutout.
   f. High condenser pressure cutout.
   g. Water Flow Interlock: Water flow switch to prevent starting compressor without chilled and condenser water flow.
5. Power Controls: Manufacturer's standard, unit mounted, factory wired, single-point connection, with the following power control options:
   a. External overload protection.
   b. Control circuit fuse.
   c. Power terminal block.
   d. Lockout restart timer.
   e. Combination controller and disconnect.
6. Interface to campus BMS?

C. Refrigerant Monitor:
1. UL 2075 refrigerant monitor to continuously monitor mechanical equipment rooms for refrigerant concentrations between 0 and 1000 PPM. Unit enclosed in NEMA 4 cabinet. Monitor shall draw room air though an infrared photo-acoustic sensing device allowing accurate measurement of refrigerant vapors. Unit shall be inherently zero-stable and include sample filters. Monitor shall signal alarm levels at three concentration levels plus a unit "trouble" alarm that indicates internal problems with monitor.
2. Interface Module: Minimum of a backlit, 2 line, and 16-character language display. Module capable of remote mounting.
3. Input: 4-20 mA.
4. Output: 0-10vdc and a 4-20 mA analog output proportional to the displayed refrigerant concentration.
5. Latched alarms re-settable from a remote source via a contact opening.
6. Accessories: Alarm package consisting of 3 flashing lights and audible alarm mounted in one assembly for remote mounting.

PART 3 - EXECUTION

3.1

3.2 INSTALLATION, GENERAL

A. Install chillers on 4-inch thick concrete base, 4 inches larger on each side than base of unit. Anchor chiller and vibration isolators to concrete base.

B. Maintain manufacturer's recommended clearance for service and maintenance.

C. Connect piping to chiller with shutoff valves and flanges at each connection.

D. Label the amount of refrigerant in the system in pounds.

E. Provide flanges at each condenser and chilled water connection to chiller. Provide removable sections to permit removal for access to tube bundles for cleaning. Pipe sections shall be no longer than 4 feet or shall consist of a removable elbow in order to be removable without heavy equipment.

F. Place isolation valves on piping to permit removal of sections described above without draining of chilled or condenser water.

G. Controls:
   1. Wire chiller so it cannot start unless chilled water and condenser water circulating pumps are running.
   2. Start and stop chillers automatically through the chiller control panel.

3.3 TESTING, CLEANING, AND CERTIFICATION

A. Test each chiller before shipment. Provide certified test report to confirm performance, include capacity test, power consumption test, and Part Load Value at ARI standard conditions.

B. Complete manufacturer's installation and startup checklist.

C. Test and adjust controls and safeties.

D. Flush and clean chillers according to manufacturer's instructions.

3.4 COMMISSIONING (DEMONSTRATION)

A. Provide services of a factory authorized service representative to provide startup services and to demonstrate and train the university's representative. Before start-up, manufacturer shall scope the chiller tubes to ensure they are not damaged or twisted.

B. Provide 4 hours of instruction to the university's representative. Include operation of chillers including accessories and controls, procedures for startup and shutdown, troubleshooting, servicing, and preventive maintenance. Review data in the maintenance manuals.

END OF SECTION 23 64 16

SECTION 32 10 00 - BASES, BALLASTS, AND PAVING

PART 1 - GENERAL

1.1 SYSTEM PERFORMANCE REQUIREMENTS

A. Design Requirements
   1. Equipment Pads:
      a. Determine location of pads for Chiller with the University Facility Operations, and the campus Architect through the University Project Manager.
      b. Develop joint pattern to:
         1) Prevent cracking from expansion and contraction.
         2) Compliment joint pattern in adjacent surfaces.
         3) Saw cut joints are accepted as an alternative method to tooled joints.
      c. Provide a medium broom finish perpendicular to travel direction.
      d. Detectable Warnings: In accordance with local jurisdiction.
      e. Take precaution to avoid puncturing existing irrigation or electrical lines with concrete form materials. The contractor will cover all repair costs.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Equipment Pad:
   1. Concrete: 6 inches thick, 4000 psi
   2. Reinforcing: Fiber-mesh

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 32 10 00

SECTION 26 00 00 - ELECTRICAL

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Branch Circuit Requirements:
   1. Provide dedicated neutral conductors for all circuits.

B. Exterior Electrical Equipment:
   1. Provide ventilation for primary switching and exterior substations. Maintain positive elevation for exterior electrical equipment to protect against wet weather.

C. Demolition:
   1. Demolish all devices, conduit, wiring and associated equipment which do not remain in a remodel.
   2. Completely remove all conduit, wiring, boxes, hangers, etc. back to the source.
   3. Abandoned devices and equipment are not acceptable.
   4. Recycle or dispose of all demolished items at a licensed facility.

D. Refer to Section 01 31 00 – Project Management and Coordination for additional details.

PART 2 - PRODUCTS

A. Not Applicable

PART 3 - EXECUTION

A. Not Applicable

END OF SECTION 26 00 00

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

1.2 DEFINITIONS

A. Refer to Article 100 of the currently adopted National Electrical Code for definitions as applicable to this project.

B. Other definitions:
1. "Concealed": Embedded in masonry, concrete or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
2. "Exposed": Not installed underground or "concealed" as defined above.
3. "Furnish" or "Provide": To supply, install and connect up complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
4. "Install": To erect, mount and connect complete with related accessories.
5. "Indicated", "Shown" or "Noted": As indicated, shown or noted on drawings or specifications.
6. "Related Work" includes, but is not necessarily limited to, mentioned work associated with, or affected by, the work specified.
7. “Reviewed", "Satisfactory", "Accepted", or "Directed": As reviewed, satisfactory, accepted, or directed by or to Engineer.
8. "Similar": Equal in materials, weight, size, design, construction, capacity, performance, and efficiency of specified product.
9. "Supply": To purchase, procure, acquire and deliver complete with related accessories.
10. "Wiring": Raceway, fittings, wire, boxes and related items.

1.3 SUBMITTALS

A. Submittals shall be made in accordance with General Conditions of Contract and the requirements of Section 01 33 00.

B. Shop drawings shall include equipment catalog cuts or manufacturer's printed data identifying: dimensions, weights, recess openings, equipment arrangements, electrical characteristics with bus size, electrical rating, material, wiring diagrams indicating circuit arrangement and NEMA rating for, but not limited to the following:
1. Enclosed Switches and Circuit Breakers
2. Contactors
3. Wiring Devices
4. Hangers and Supports for Electrical Systems
5. Grounding and Bonding
6. Modular Wiring Systems
7. Electrical Systems Control
8. Communication Systems

C. Submittals shall also include ¼” scale layouts of all electrical rooms, telecom rooms, fire alarm rooms and generator rooms. Include all equipment sizes and clearances.

D. Submit composite coordination drawings to include location and routing of the electrical system components in relation to the mechanical ducts, piping and structural beams.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: All electrical work at the University shall be performed by a State of Colorado licensed contractor under the supervision of a licensed electrician. Contractors shall verify that electricians are currently licensed by the State of Colorado and shall supply Project Manager with names

and license numbers. Contractor shall have a minimum of 3 years of satisfactory performance in conducting the type of work specified.

1. ANSI/NFPA 70 - National Electrical Code.
2. ANSI/IEEE C2 - National Electrical Safety Code.
3. NECA - Standard of Installation.
4. NFPA – National Fire Protection Association.
5. IEEE – The Institute of Electrical and Electronics Engineers.
6. NEMA – National Electrical Manufacturer Association.
7. The University/Anschutz Medical Campus Project Guidelines and Standards.
8. International Building Code in accordance with the Campus Building Official.
9. ASTM - American Society of Testing Materials
10. IPCEA - Insulated Power Cable Engineers Association
11. Underwriter's Laboratories (UL)
12. American National Standards Institute (ANSI)
13. Other requirements as listed elsewhere in these specifications.

B. The drawings and specifications take precedence when they are more stringent than codes, statutes, or ordinances in effect. Applicable codes, ordinances, standards and statutes take precedence when they are more stringent than, or conflict with the drawings and specifications.

C. Record Documents:

1. Maintain a separate set of contract electrical drawings at the site in accordance with Section 01 74 00 to show the following:
   a. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
   b. All branch circuits, feeders, communications conduits embedded in concrete, dimensioned from prominent building lines.
   c. Equipment locations (exposed and concealed) dimensioned from prominent building lines.
   d. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

D. Operations and Maintenance Data:

1. O and M Data shall be provided in accordance with Section 01 78 23 including the following information:
   a. Description of function, normal operating characteristics and limitations, fuse curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
   b. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   d. Servicing instructions and lubrication charts and schedules.
   e. Complete list of parts and wiring diagrams.
   f. Names, addresses and telephone numbers of the Contractor, Sub-contractors and local company responsible for maintenance of each system or piece of equipment.
   g. All information shall be permanently bound in a 3-ring binder. The job name and address, and Contractor's name and address shall be placed on the cover and spine of each binder in a permanent manner. Dymo-tape is not acceptable.
   h. Copies of all test reports shall be included in the manuals.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products in accordance with manufacturer's instructions, and the requirements of Section 01 10 00.

1.6 WARRANTY

A. All electrical equipment, materials and workmanship warranties shall be provided in accordance with the requirements of Section 01 78 36 and the following:
   1. The Contractor warranties the electrical system, material and workmanship, for a period of one year from the date of the University final acceptance of the installation unless as otherwise noted in Commissioning.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. All equipment and materials installed shall be new, unless otherwise specified. Defective or damaged materials shall be replaced or repaired, prior to final acceptance, in a manner acceptable to the Engineer or the University and at no additional cost to the University.

B. All electrical materials shall be acceptable for installation only if labeled or listed UL and, if accepted, by the authority having jurisdiction.

C. All major equipment components shall have the manufacturer's name, address, model number, and serial number permanently attached in a conspicuous location.

D. Fire Seals:
   1. Material: Fire stopping material shall be asbestos free, 100% intumescent, have code approval under BOCA, ICBO, SSBC, NFPA 101, NFPA 70, and be capable of maintaining an effective barrier against flame and gases in compliance with the following requirements.
   2. Flame Spread: 25 or less, ASTM E84
   3. Fire Resistance and Hose Stream Tests: Fire stopping materials shall be rated “F" and "T" in accordance with ASTM E 814 or UL 1479. Rating periods shall conform to the following:

(F)	3	(T)	3	Time-rated floor or wall assemblies.
(F)	3	(T)	3	Openings between floor slabs & curtain wall.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Construct Work in sequence under provisions of Division 1 where applicable.

B. Electrical Contractor shall coordinate Divisions 26, 27, and 28 work with the installer of Division 21, 22 and 23 and other work to ensure that code required clearances relating to space required for access to electrical equipment is properly maintained.

C. Install Work using procedures defined in NECA Standard of Installation.

D. Workmanship shall conform to highest industry standards for each trade involved in installation of the Work.

E. Upon completion of work, all equipment and materials shall be installed complete, thoroughly checked, correctly adjusted, and left ready for intended use or operation. All work shall be thoroughly cleaned and all residues shall be removed from surfaces.

F. Exterior surfaces of all material and equipment shall be delivered in a perfect, unblemished condition.

G. Carefully lay out all work in advance so as to eliminate where possible, cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings and roofs. Any damage to the building, structure, piping, ducts, equipment or any defaced finish shall be repaired by skilled mechanics of the trades involved at no additional cost to the University.

H. All openings made in fire-rated walls, floors, or ceilings shall be patched and made tight in a manner to

conform to the fire rating for the surface penetrated. Paint to match surface when visible.

I. All penetrations required through completed concrete construction shall be core drilled at minimum size required. Precautions shall be taken when drilling to prevent damage to structural concrete. The Contractor shall obtain permission from the Architect and Structural engineer before proceeding with drilling.

J. Sleeve Seals: Provide sleeve seals for penetrations located in foundation walls below grade, or in exterior walls, of one of the following:
   1. Caulk between sleeve and raceway with approved Caulk material.
   2. Mechanical Sleeve Seals: Modular mechanical type, as manufactured by Thunder line Corp., consisting of interlocking synthetic rubber links shaped to continuously fill annular space between raceway and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal.

K. Install equipment and materials to provide required Code clearances and access for servicing and maintenance. Coordinate the final location with piping, ducts, and equipment of other trades to insure proper access for all trades. Coordinate locations of concealed equipment, disconnects, and boxes with access panels and doors. Allow ample space for removal of parts, fuses, lamps, etc., that require replacement or servicing according to the National Electric code and the AHJ.

L. Extend all conduits so that junction and pull boxes are in accessible locations.

M. Install access panel or doors where equipment or boxes are concealed behind finished surfaces in areas such as restrooms. These access doors shall be a minimum of twenty by twenty inches or as required to accommodate full pull box or equipment access.

N. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

O. Electrical system layouts indicated on drawings are generally diagrammatic but shall be followed as closely as actual construction and work of other trades will permit. Govern exact routing of raceways and locations of outlets by structure and equipment served. Take all dimensions from engineering drawings.

P. Consult all other drawings. Verify all scales and report any dimensional discrepancies or other conflicts to Engineer before submitting bid.

Q. Furnish and install all necessary hardware, hangers, blocking, brackets, bracing, runners, etc. required for equipment specified under this Division.

R. Remove all unused or abandoned conduit, junction boxes, panels, and other electrical components back to the source.

S. Provide all power feeds and final connections to motors and other electric equipment furnished under Divisions 21, 22, and 23.
   1. Install and wire through all control devices which directly handle full load motor or electric heating equipment current, such as magnetic starters, line voltage thermostats, P.E. switches, etc. which are furnished by Electrical Contractor. Located where shown on the electrical drawings.
   2. Provide disconnects for all mechanical equipment as indicated on project drawings.
   3. Provide all power and control wiring which directly handles full load current of motors or electric heating equipment.

3.2 TESTING, CLEANING AND CERTIFICATION

A. Operating and Acceptance Tests: Provide all labor, instruments, and equipment for the performance of tests as specified below and elsewhere in these specifications.
   1. Perform a careful inspection of the main switchboard bus structure and cable connections to verify that all connections are mechanically and electrically tight.

2. For a one-day period after the remodeled area has been placed into normal service, record the full load current in each phase or each line at the panel bus and submit to the Engineer.

B. Test Reports:
1. Test Reports: Submit three (3) copies of test results.
2. The final University inspection of the project will not be made until a satisfactory report is received and approved by the University Project Manager.
3. Results shall include:
   a. Insulation resistance readings on all feeders entering main distribution switchboard, each phase.
   b. Resistance to ground readings for main distribution switchboard service ground.
   c. Insulation resistance readings for all motors and motor feeders 5 horsepower or greater.
   d. Full load current reading for main service entrance and main distribution panel board, each phase.
4. Testing shall be done by an independent testing agency.

C. Clean-Up: Remove all materials, scrap, etc., relative to the electrical installation, and leave the premises and all equipment, lamps, fixtures, etc. in a clean, orderly condition. Any costs to the University for clean up of the site will be charged against the Contractor.

3.3 COMMISSIONING (DEMONSTRATION)

A. Acceptance Demonstration: Upon completion of the work, at a time to be designated, the Contractor shall demonstrate for the University the operation of the entire installation, including all systems provided under this contract.

B. The Contractor shall furnish the services of a qualified representative of the supplier of each item or system who shall instruct specific personnel, as designated by the University, in the operation and maintenance of that item or system.
1. Instruction shall be given when the particular system is complete, and shall be of the number of hours indicated. A representative of the Contractor shall be present for all demonstrations.

END OF SECTION 26 05 00

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Provide complete wire and cable system to meet the requirements of the project. Provide wire sizes in accordance with NEC.

1.2 SUBMITTALS

A. Product data shall be submitted for in accordance with the requirements of Section 26 05 00 each of the following:
   1. Wires
   2. Cables
   3. Connectors

1.3 QUALITY ASSURANCE

A. Wire and cable shall be provided and installed in accordance with the requirements of Section 26 05 00.

B. Installer Qualifications and Certifications: Firms with at least 3 years of successful installation experience with projects utilizing electrical wiring cabling work similar to that required for this project.

C. Regulatory Requirements: Conform to applicable code relations regarding toxicity of combustion products of insulating materials

D. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Wire and cable shall be delivered, stored and handled in accordance with the requirements of Section 26 05 00.

B. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA-specified type wire and cable reels.

C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.

D. Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

1.5 WARRANTY

A. Wire and cable warranties shall be provided in accordance with the requirements of Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following (for each type of wire, cable, and connector):
   1. Wire and cable:
      a. Triangle - PWC
      b. American Wire and Cable Co.
      c. Anaconda-Ericsson Inc; Wire and Cable Div.
      d. Belden Div; Cooper Industries
      e. General Cable Corporation
      f. General Electric
      g. Okonite
   2. Connectors:
      a. O-Z/Gedney Co.
      b. AMP, Inc.
      c. Burndy Corporation
      d. Ideal Industries, Inc.
      e. 3M Company
      f. Thomas and Betts Corp.

2.2 MATERIALS, GENERAL

A. Wires and Cables:
   1. Provide new wire and cable suitable for the temperature, conditions, and location where installed. All cable shall be new and shall conform to or exceed IPCEA requirements. Building wire shall be insulated with THHN/THWN/THW or XHHW insulation, rated 600 volt.
   2. Conductors: Provide solid conductors for power and lighting circuits 12 AWG and smaller. Provide stranded conductors for 10 AWG THHN/THWN and larger. In sizes 250 MCM and larger use type THW or THWN. In sizes #1 AWG and smaller all conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75 degree C), except as follows:
      a. Where conduit temperature will exceed 100 degree F, use type THHN (90 degree C). Type XHHW (90 degree C) permissible in dry locations.
   3. Conductor Material: Provide copper for all wires and cables.
   4. Metal Clad cable is acceptable.
   5. Use colors of wires as specified in paragraph 3.5 of this section.
   6. For general applications, other than special use, use THHN insulated wire.
   7. Type NM, NMC, NMS cable are not acceptable for any application.
   8. Use copper wire only.
   9. No wire splices shall be allowed in the conduit or conduit fittings. All splices shall be done in an approved box.
   10. Grounding conductors shall be copper type THHN with green integrally-colored insulation, sized to meet NEC.
   11. Plenum rated cable when required by Plenum conditions.

B. Connectors:
   1. Provide UL type factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperatures equal to or greater than those of the wires upon which used.

C. Wire Connectors:
   1. For wires size #8 AWG and smaller, insulated pressure type (with live spring) rated 105 degree C, 600 volt, for building wiring and 1000 volt in signs or fixtures. 3M or Ideal.
   2. For wires size #6 AWG and larger, T & B or equivalent compression type with 3M #33 or #88 tape insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that mechanical work likely to damage cable has been completed.

3.2 INSTALLATION, GENERAL

A. Install electrical cables, wires and connectors in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate wire/cable installation work, including electrical raceway and equipment connection work, with other work. Pull no wire into any portion of conduit system until all construction work, which might damage the wire, has been completed.

C. BAS Conductor installation: (see Section 23 09 13)

D. Wires and Cables:
1. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway. Do not use rope hitches for pulling attachment to wire or cable. Do not exceed manufacturer's tension requirements.
2. Keep conductor splices to minimum. Install all wire continuous from outlet to outlet or terminal to terminal. Splices in cables when required shall be made in hand holes, pull boxes, or junction boxes and shall be in strict accordance with cable manufacturer's recommendations utilizing solder less connectors NEMA/UL approved for the use. Splice only in accessible junction boxes. Use splices and tap connectors which are compatible with conductor material.
3. Install splices and tapes, which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
4. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486 for copper.
5. Support cables above accessible ceilings, do not rest on ceiling tiles. Use spring clips and hanger rods, bridle rings or 'J' hooks, independent from the ceiling suspension system to support cables from structure.
6. Provide adequate length of conductors within electrical enclosures and form the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cables to individual circuits. Make terminations so there is no bare conductor at the terminal.
7. Make up splices in outlet boxes with 8-inch minimum of correctly color-coded tails left in box. Splices in wires size #8 AWG and smaller shall be made with insulated spring type wire connectors, "Scotchlok" or equivalent. Splices in larger wire and cables shall be made with indent connectors NEMA/UL approved for the purpose.
8. Use split bolt connectors for copper wire splices and taps, 6 AWG through 1 AWG. Tape un-insulated conductors and connectors with electrical tape to 150% of the insulation value of conductor. Rubber, friction and 3M-33 or 88 or better. Two (2) layers minimum each.
9. Use copper compression connectors for copper wire splices and taps, 1/O AWG and larger. Tape un-insulated conductors and connectors with electrical tape to 150% of the insulation value of the conductor. Rubber, friction and 3M-33 or 88.
10. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
11. Thoroughly tape the ends of spare conductors in boxes and cabinets.
12. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural member, and follow surface contours, where possible.
13. Make all ground, neutral and line connections to receptacle and wiring device terminals as recommended by manufacturer. Provide ground jumper from outlet box to individual ground terminal of devices.
14. Parallel conductors shall be cut to the same length and be the same type of wire.
15. All splices in control panels, terminal junction boxes, low voltage control circuits and fire alarm conductors shall be on numbered terminal strip.
16. When routed in a wall, install all thermostat wire, fire alarm, computer cable, low voltage cable, and other communication cable in conduit.
17. All junction boxes shall be fully accessible.

18. All wiring shall be routed through an acceptable raceway regardless of voltage application, unless specified otherwise under other sections of these standards.

3.3 TESTING, CLEANING AND CERTIFICATION

A. Refer to Section 26 05 00 for testing, cleaning, and certification requirements.

B. Prior to energizing circuitry, check installed wires and cables with megaohm meter to determine insulation resistance levels to ensure requirements are fulfilled. Test shall be made on all feeders regardless of size and on all branch circuits with No. 4 AWG and larger conductors.

C. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

D. Subsequent to wire and cable hook-up, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

3.4 COMMISSIONING (DEMONSTRATION)

3.5 SCHEDULES

A. Color code secondary service, feeder, and branch circuit conductors as follows:

120/208 Volts	Phase	277/480 Volts
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green
Switch leg - Pink 3 & 4 way travelers - Purple		

B. Conductors shall be solid color for entire length.

C. EXCEPTION:
1. Conductors 8 AWG and larger may be black and shall be with color-coded at each termination and in each box or enclosure. For a distance of 6 inches use half-lapped 3/4 inch plastic tape in the specified color. Do not cover cable identification markings. Adjust tape locations to prevent covering of markings.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Maintain existing grounding electrode system.

B. Provide equipment ground as required for new chiller.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide a separate insulated equipment-grounding conductor in all feeders. Terminate each ground conductor to the bushing and ground lug.

B. All grounding materials shall be copper with the exception of ground rod, which may be copper clad steel.

C. Grounding and Bonding for Communications Systems. Provide code-sized ground cable bonding jumpers, installed with ground clamps, across all conduit expansion couplings and fittings.

D. Provide a corrosion-resistant finish to field connections, buried metallic bonding products, and where factory applied protective coatings have been destroyed, where subject to corrosive action.

E. Provide an equipment-grounding conductor in all nonmetallic and flexible conduits.

F. Provide equipment-grounding conductor in all branch circuits. Route to switches, receptacles, equipment enclosures, equipment, and panels etc. and ground as required.

G. Use mechanical grounding connectors for all grounding connections. Exothermic welded connections may be used underground or to building steel.

H. Minimum ground resistance:

Table	
Equipment	Earth Ground Resistance to Equipment (Ohms)
Pad Mount Transformer	5
Secondary neutrals and other ground	10

I. Provide a separate insulated equipment-grounding conductor in feeder and branch circuits. Terminate each end on a grounding lug, buss or bushing.

J. Provide grounding bushings and bonding jumpers for all conduits terminating in reducing washers, concentric, eccentric or oversized knockouts at panel boards, cabinets, and gutters.

K. Provide bonding wire in all flexible conduits.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Provide equipment supports rated for the supported loads.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Conduit Hangers: Galvanized steel with special accessories for purpose and adequate to support load imposed.

B. Coatings: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance-using NEMA/UL approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

C. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, and wall brackets.

D. Fasteners: Types, materials, and construction features as follows:
1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.

E. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for no armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

G. U-Channel Systems: 16-gauge steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

H. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:
1. One-Hole Conduit Straps or Minerallac: For supporting 3/4 inch and smaller conduit, galvanized steel.
2. Two-Hole Conduit Straps or Minerallac or industry approved equal: For supporting 1 inch and larger conduit, galvanized steel; 3/4 inch strap width; and 2-1/8 inch between center of screw holes.

I. Fabricated Supporting Devices:
1. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.
2. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

3. Pipe Sleeves: Provide pipe sleeves of one of the following:
   a. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint.
   b. Fabricate sleeves from the following gauge metal for sleeve diameter noted:
      1) 3-inch and Smaller: 20 gauge
      2) 4-inch to 6-inch: 16 gauge
      3) Over 6-inch: 15 gauge
   c. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
   d. EMT, IMC, or Rigid Conduit.

J. J-Hooks and Bridle Rings
   1. J-hooks and bridle rings maybe used to support low voltage wiring systems.

K. The following are prohibited.
   1. Plastic or fiber anchors.
   2. Drilling or structured steel members.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Conduit Hangers: Support individual conduit 1-1/2 inch and larger and all multiple conduit runs with hangers. Clamp conduits individually to each support.

B. Supports and Hangers:
   1. Support and align all raceways, cabinets, boxes, fixtures, etc., in an accepted manner and as herein specified. Support raceways on accepted types of wall brackets, specialty steel clips or hangers, ceiling trapeze hangers or malleable iron straps. Provide lead expansion shields in concrete, machine screws, bolts or welding on metal surfaces, and wood screws on wood construction. Use of powder-driven studs is prohibited without express permission from the University Project Manager.
      a. Mount all conduits to structure a minimum of 7 inches above any accessible type ceiling, or with spacing as required to permit relocation of recessed fixtures to any location.
   2. Structural and post tensioned concrete members shall not be drilled or pierced without prior approval from the University Project Manager.
   3. Where outlets are installed in steel stud type systems, provide additional cross bracing, bridging and/or straps as required to make outlet completely rigid prior to application of wall facing material.
   4. Design hangers and wall brackets so that maximum deflection will be no greater than 1/8 inch.
   5. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
   6. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:
   1. Conform to manufacturer's recommendations for selection and installation of supports.
   2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 pounds, provide additional strength until there is a minimum of 200 pounds safety allowance in the strength of each support.
   3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
   4. Use of ceiling support wires is unacceptable.
   5. Support parallel runs of horizontal raceways together on trapeze-type hangers. Use 3/8-inch diameter or larger threaded steel rods for support. Threaded rod shall be covered by ½ inch conduit from bottom of (trapeze) support to 6-inches above cable tray.

6. Support individual horizontal raceways by separate pipe hangers.
7. Space supports for raceways in accordance with NEC.
8. In all runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
9. Threaded rod supports to have bottoms cut off at a maximum length equal to rod diameter below bottom double nut. Remove sharp edges.

D. Miscellaneous Supports: Support miscellaneous electrical components separately and as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panel boards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

E. In open overhead spaces, support metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an engineer approved type of fastener not more than 24 inches from the box.

F. Sleeves: Install in walls and all other fire-rated floors and walls for raceways and cable installations as required. Where sleeves through floors are installed, extend above finish floor. For sleeves through fire rated-wall or floor construction, apply UL listed fire stopping sealant in gaps between sleeves and enclosed conduits and cables. See Engineering plans for location and extent of fire rated assemblies.

G. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, bus ways, cabinets, panel boards, transformers, boxes, disconnect switches, and control components in accordance with the following:
1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Powder-driven studs are not acceptable. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
3. Ensure that the load applied to any fastener does not exceed 25% of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESIGN REQUIREMENTS

A. Provide complete raceway system required to meet project requirements in sizes as required by NEC.

B. Utilize boxes as part of the electrical raceway system. Size boxes in accordance with NEC requirements and this standard.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Conduit: Allied
      a. Republic
      b. Carlon
   2. Fittings and Bodies:
      a. O/Z Gedney
      b. Regal was purchased by Bridgeport
      c. Bridgeport
      d. Raco
      e. Appleton
   3. Conduit Seals:
      a. Chase-Foam CTC PR-855, or approved equal
   4. Wire ways:
      a. Hinged cover or screw cover complete with all necessary fittings which shall be of one manufacturer.

2.2 MATERIALS, GENERAL

A. Metal Conduit and Tubing:
   1. Galvanized Steel Rigid Conduit (GRC):
      a. Conduit: Provide rigid steel conduit, hot-dipped galvanized with threaded ends Fittings: Threaded galvanized steel, bushings shall have nylon-insulated throat.
   2. Electrical Metallic Tubing (EMT):
      a. Conduit: Galvanized steel tubing, galvanized on the outside and coated on the inside with a hard smooth lacquer finish. Fittings: Steel compression fittings for rain-tight and concrete-tight applications. Steel set-screw for interior connections. Set-screw quick fit type for 2-1/2 inch and larger may be used. Bushings shall be threaded and have nylon insulated throat or nylon bushing.
   3. Intermediate metal conduit (IMC)
      a. Conduit: Provide intermediate steel conduit hot-dipped galvanized Fittings: Threaded galvanized steel, bushings shall have nylon-insulated throat.
   4. Rigid Aluminum Conduit:
      a. Not allowed unless otherwise noted.
   5. Flexible Metal Conduit:
      a. Conduit: Continuous spiral wound, interlocked, zinc-coated steel, NEMA/UL approved for grounding.
      b. Fittings: Cadmium plated, malleable iron. Straight connector shall be one-piece body, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. Angle connectors shall be two-piece body with

removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. All fittings 1 inch and larger shall be terminated with threaded bushings having nylon insulated throats.

c. Maximum length of 6 feet.

d. Minimum size of 1/2 inch.

6. Liquid-Tight Flexible Metal Conduit:

a. Conduit: Continuous spiral wound, interlocked zinc-coated steel with polyvinyl chloride (PVC) jacket, NEMA/UL approved for grounding.

b. Fittings: Cadmium plated malleable iron. Straight and angle connectors shall be the same as used with flexible metal conduit but shall be provided with a compression type steel ferrule and neoprene gasket sealing rings.

7. Non-metallic Rigid Conduit

a. PVC plastic schedule 40

B. Conduit Bodies:

1. General: Types, shapes and sizes, as required to suit individual applications and National Electric Code (NEC) requirements. Provide matching gasket covers secured with corrosion-resistant screws.

2. Metallic Conduit and Tubing: Use metal conduit bodies. Use bodies with threaded hubs for threaded raceways and in hazardous locations.

3. Telephone EL's are not acceptable.

2.3 MATERIALS, GENERAL

A. Sheet Steel: Flat rolled, code-gage, galvanized steel.

B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

C. Fasteners for damp or wet locations: Stainless steel screws and hardware.

D. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.

E. Metal outlet, device, and small wiring boxes:

1. General: Boxes shall be of type, shape, size, and depth to suit each location and application.

2. Steel Boxes: Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.

F. Outlet Boxes, Pull and Junction Boxes (J-Boxes):

1. General: Boxes shall have screwed or bolted-on covers of material same as box and shall be of size and shape to suit application.

2. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.

3. Hot dipped galvanized steel boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.

4. Outlet Boxes: Hot-dipped galvanized of required size, 4 inch square, 2” depth minimum or octagonal and of depth required for flush mounted devices and lighting fixtures. Cast-type with gasketed covers for surface-mounted devices. All outlets for exterior application shall be cast, weatherproof type with gasket and cast cover plate.

5. Junction and Pull Boxes: Use outlet boxes as J-boxes wherever possible. Larger J-boxes pull boxes shall be accessible and shall be fabricated from sheet steel, sized according to code.

G. Non metallic boxes are not permitted.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Conduit Sizes:
1. The conduit shall be sized in accordance with NEC.
   a. For power and lighting circuits, the minimum conduit size shall be 3/4”
   b. Flexible and Liquid-tight Flexible Conduit: 1/2 inch for all runs. Maximum 6-foot length.
   c. Conduits used for home runs shall contain only the conductors for the circuits indicated on the drawings. Combining unrelated multiple home runs into a single conduit would not be permitted.

B. Type of Conduit Used
1. Rigid Galvanized conduit or intermediate metallic steel conduit shall be installed in the following areas.
   a. All outdoor non-conditioned locations concealed and exposed.
   b. Interior exposed. Below 10 feet to floor. PVC coated 90 degree elbows underground when penetrating floor slabs.
2. Electrical Metallic Tubing (EMT):
   a. Interior concealed spaces.
   b. Interior exposed above 10 feet to floor.
   c. Not permitted underground, in concrete, and in hazardous or corrosive areas.
3. Sealtite metal conduit shall be provided for: Makeup of motor, transformer or equipment, and/or raceway connections where isolation of sound and vibration transmission is required. For connections in locations exposed to weather, or in interior locations subject to moisture, watertight flexible conduit shall be used.
4. Non-metallic Rigid Conduit:
   a. In concrete and underground.
   b. Not permitted for interior use.

C. General: Install electrical raceway in accordance with manufacturer’s written installation instructions, applicable requirements of NEC, and as follows:
1. Conceal all conduits unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes.
2. Elevation of Raceway: Where possible, install horizontal raceway runs above water and steam piping, keep close to structure.
3. Complete installation of electrical raceways before starting installation of conductors within raceways.
4. Provide supports for raceways as required per NEC. Prevent foreign matter from entering raceways by using temporary closure protection.
5. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel. All bends shall be made in an approved bending machine or factory-made. Hickey bends will not be permitted in conduits larger than 3/4 inch. Refer to Section 27 05 28 for special bending requirements for Telecommunications Systems.
6. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. Install expansion fittings across all structural construction joints and expansion/deflection couplings across all structural expansion joints and in every 200 feet of linear conduit run. A flexible bonding jumper at least three times the nominal width of the joint shall be installed.
7. Run concealed raceways parallel and perpendicular to building elements at right angles.
8. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. Paint all exposed raceways to match surrounding area.
9. Run exposed and parallel raceways together. Make bends in parallel runs from the same centerline so that the bends are parallel. Factory elbows may be used only where they can be installed parallel. In other cases, provide field bends for parallel raceways.
10. Make raceway joints tight. Where joints cannot be made tight, use bonding jumpers to provide

electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Joints in non-metallic conduits shall be made with solvent cement in strict accordance with manufacturer's recommendations.

11. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. RGC shall be secured with double locknuts and an insulated metallic bushing. EMT shall be secured with one locknut and shall have nylon-insulated throats or threaded nylon bushings from 1/2 inch to 1 inch. 1-1/4 inch and above shall be metal with nylon insulated throats. Use grounding type bushings for feeder conduits at switchboards, panel boards, pull boxes, transformers, motor control centers, VFDs, etc.
12. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
13. Install pull wires in empty raceways. Use #14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end
14. Telecommunications and Signal Systems Raceways: Refer to Section 27 05 28 Pathways for Communications.
15. Install raceway-sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL Listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway-sealing fittings at the following points and elsewhere as indicated:
    a. Where conduits enter or leave hazardous locations.
    b. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
    c. Where required by the NEC.
16. Flexible Connections: Use short length (maximum of 6 feet) of flexible conduit for recessed and semi-recessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet locations. Install separate ground conductor in all flexible connections.
17. Conduit Seals: Conduit passing through concrete walls shall be sealed.
18. Where conduits are to be installed through structural framing members, the contractor shall provide sleeves. Cut all openings in concrete with rotary type drill, or other method as approved by the University Project Manager. Holes cut with pneumatic hammer will not be accepted. For areas where sleeves have not been provided, the Engineer's written approval must be obtained prior to cutting, notching or drilling of structural framing members.
19. Ream the ends of all cut and/or threaded conduit. Ends shall be cut square.
20. Use of running threads for rigid metallic conduit are not permitted. When threaded couplings cannot be used, provide 3-piece union or solid coupling.
21. Conduits shall not cross pipe shafts or ventilation duct openings "access panel".
22. Conduit shall not obstruct full and direct access to equipment requiring maintenance. This includes but is not limited to valves, actuators and terminal box controllers.
23. Install an insulated ground conductor in all conduits.
24. Where individual conduits penetrate fire-rated walls and floors, provide pipe sleeve one size larger than conduit; pack void around conduit with fire rated insulation and seal opening around conduit with UL Listed foam silicone elastomer compound. Conduits on trapeze type support system shall require fire taping only.
25. Where conduit sleeves penetrate fire rated floors or walls for installation of system cables, AC or MC cables, or modular wiring cables, pack void around cables or empty sleeve with fire rated insulation and fill ends with fire-resistive compound. Seal opening around sleeve with UL Listed foam silicone elastomer compound.
26. Provide separate raceway systems for each of the following:
    a. Power Distribution
    b. Low voltage systems, including telephone and communications, EQ alarm, security, fire alarm.
    c. Audio/Visual
27. Provide for waterproofing of all raceways, fittings, etc., which penetrate the roof to preserve the

weatherproof integrity of the building. Installation of materials shall conform to the following:

a. General:

1) Install all raceways concealed except at surface cabinets, for motor and equipment connections and in mechanical equipment rooms. Install a minimum of 6 inch from flues, steam pipes or other heated pockets for water-flashing and counter-flashing or pitch pockets for waterproofing of all raceways, outlets, fittings, etc., which penetrate roof. Route exposed raceways parallel or perpendicular to building lines with right angle turns and symmetrical bends. Concealed raceways shall be run in a direct line, and where possible, with long sweep bends and offsets.

2) Provide raceway expansion joints with necessary bonding conductor at building expansion joints and where required to compensate for raceway or building thermal expansion and contraction. Terminate raceways 1-1/4 inch and larger with insulated bushing or rain tight connections with insulated throats.

28. Special areas methods for raceway installation (with appropriate seal-offs, explosion-proof fittings, etc.), in all special occupancy areas, as defined and classified in Article 500 of the National Electric Code (NEC), shall be in accordance with that Article.
29. If type MC or AC cable is used for branch circuits, the home run conduit will be EMT and must run from the panel to within 10 feet horizontally of the first device served.
30. All underground raceways, not under the building footprint, shall be installed so it slopes away from the building.

D. Raceway Installation:

1. Surface raceways, where indicated on drawings, shall be metal and of a size approved for number and size of wires to be installed, shall be installed in a neat, workmanlike manner, with runs parallel or perpendicular to walls and partitions. Raceways, elbows, fittings, outlets and devices shall be of same manufacturer, and designed for use together.
2. Wire ways, where indicated, complete with elbows, tees, connectors, adaptors, etc., with all parts factory-fabricated and of same manufacture.

3.2 INSTALLATION, GENERAL

A. Boxes:

1. Every J-box shall be secured, independent of conduit entries into the box. Boxes shall be secured to the building structure. Ceiling wire shall not be used to support (secure) J-boxes.
2. Box fill shall be governed by code requirements. Only the allowable amount of conduit entries shall be allowed into the box.
3. Box covers shall be marked so as to indicate the voltage, panel number, and circuit number of the enclosed conductors.
4. Each J-box shall have only one voltage installed.
5. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
6. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.
7. Remove sharp edges where they may come in contact with wiring or personnel.
8. All conduits connected to a flush panel shall be concealed.

B. Outlet Boxes:

1. Exact location of outlets and equipment shall be governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment. Verify final location of all outlets, panels, equipment, etc. with the University Project Manager.

C. Installation of Pull and J-Boxes:

1. Box selection: For boxes in main feeder conduit runs, use minimum 8-inches square by 4-inches deep or as needed per NEC. Do not exceed 6 entering and 6 leaving raceways in a single box.
2. Cable supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inches inside boxes.
3. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.

4. Every J-box shall be secured, independent of conduit entries into the box. Boxes shall be secured to the building structure. Provide rigid supports for all J-boxes, ceiling wire supports are not acceptable.
5. Box fill shall be governed by code requirements. Only the allowable amount of conduit entries shall be allowed into the box.
6. Box covers shall be marked so as to indicate the voltage, panel numbers, and circuit number of the enclosed conductors. Use pre-printed labels, marking cover with permanent marker is not acceptable.

D. Grounding:
1. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

E. Pull and J-Boxes and Cabinets:
1. Construct J-boxes or pull boxes not over 150 cubic inches in size as standard outlet boxes, and those over 150 cubic inches the same as "Cabinets," with hinged covers of same gauge metal. Removable covers must be accessible at all times.
2. Provide a standard access panel having a hinged metal door neatly fitted into a flush metal trim, where a J-box or equipment is located above non-accessible ceilings or behind finished walls. Coordinate location and type with the University Project Manager. Access panels shall be minimum 24”x24” or 6” larger than pull box.
3. All cabinets shall be set rigidly in place with fronts straight and plumb, center panelboard interiors in door openings.

END OF SECTION 26 05 33

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. All electrical equipment and systems shall be properly labeled in accordance with this section. It includes requirements for electrical identification components including but not limited to the following:
   1. Identification labeling for raceways, cables, and conductors.
   2. Equipment labels and signs.

1.2 SUBMITTALS

1. Samples of each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Ideal Industries, Inc.
   2. LEM Products, Inc.
   3. Markal Corp.
   4. Panduit Corp.
   5. W.H. Brady, Co.

2.2 MATERIALS, GENERAL

A. Nameplates: Engraved plastic laminate, black letters on white background for normal systems and white letters on red background for emergency systems.

B. Electronic Labels: 9mm self-adhesive tape, black letters on clear for normal systems and red letters on clear for emergency systems. Embossed DymoType labels are not accepted.

C. Wires and Cable Markers: Cloth markers, split sleeve and tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

B. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. Degrease and clean surfaces to receive nameplates and labels.

C. Conduit Identification: Use adhesive marking labels at 40 foot intervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible. Use the following colors:
   1. 600 Volt and Below: Black letters on orange background indicating feeder identification and
   2. Other Systems: Provide color banding as specified below.

D. Identify System Raceways with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pre-tensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Provide Brady B-946 vinyl or equivalent. Colored duct tape is not acceptable. Apply the following colors:
   1. Security System: Blue and Yellow with Gray Cable.
   2. Telecommunications System: Green and Yellow with Blue and White Cables.
   3. Fire Alarm Systems: Red with Red Cable.
   4. Audio/Visual Systems: Violet.
   5. Building Automation System (BAS): Blue and Green.
   6. Lighting Control Cabling shall be Green.

E. Identify Junction, Pull, and Connection Boxes: Identification of systems and circuits shall be pressure-sensitive, self-adhesive label indicating system voltage and identity of contained circuits on outside of box cover. Color code shall be same as conduits for pressure sensitive labels. Use pressure-sensitive plastic labels at exposed locations and indelible marker (black or red) at concealed boxes. All fire alarm boxes shall have covers painted red.

F. Power Circuit Identification: Tag or label conductors as follows:
   1. Match identification markings with designations used in panel boards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

G. Install equipment/system circuit/device identification as follows:
   1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless the unit is specified with its own self-explanatory identification. Text shall match terminology and numbering of the Contract Documents and shop drawings. Identification must include equipment name, voltage, phase, amperage, and fed from. Apply labels for each unit of the following categories of electrical equipment.
      a. Switchboards, switchgear, panelboards and enclosures, 1/2" high lettering.
      b. Access doors and panels for concealed electrical items, 1/4" letters

H. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panel boards and alarm/signal components, where labeling is specified elsewhere.

I. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

END OF SECTION 26 05 53

SECTION 26 20 00 - LOW VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Motors, Starters and Protection: Electrical contractor will supply and install all motor controllers and disconnect switches.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Cartridge Fuses:
      a. Bussmann Div., Cooper Industries, Inc.
      b. Littelfuse Inc.
      c. Or equal
   2. Fusible Switches:
      a. Square D Co.
      b. Allen-Bradley Co.
      c. General Electric Co.
   3. Eaton-Cutler HammerMolded-Case Circuit Breakers:
      a. Square D Co.
      b. General Electric Co.
      c. Siemens Energy & Automation, Inc.
      d. Eaton-Cutler HammerABB Power Distribution, Inc.
   4. Eaton-Cutler HammerSafety Switches:
      a. Siemens – Energy Automation Or equal
   5. Motor Starters:
      a. Allen-Bradley Co.

2.2 MATERIALS, GENERAL

A. Over current Protective Device:
   1. General: Provide OCPDs in indicated types, as integral components of panelboards, switchboards, motor control centers, and other related equipment; and also as individually enclosed and mounted single units.
   2. Where OCPDs are to be installed in existing panelboards, switchboards, and motor control centers, they shall be of the same manufacture and type as those existing in the equipment.

B. Cartridge Fuses:
   1. General: Unless indicated otherwise, provide nonrenewable cartridge fuses of indicated types, classes, and current ratings that have voltage consistent with the circuits on which used.
   2. All fuses used for main, feeder, or branch-circuit protection shall be UL listed, current limiting fuses with 200,000 ampere interrupting rating and shall be so labeled. Fuses used for supplementary protection (other than branch circuit protection) shall be as specified above or shall be UL approved or component recognized for such purposes. The same manufacturer shall furnish

all fuses provided. Should equipment provided require a different UL class or size of fuse, the engineer shall be furnished sufficient data to ascertain that system function will not be adversely affected.

3. To simplify fuse replacement, reduce spare fuse inventory and insure adequate thermal protection, all fuses 600 amperes and below shall be true dual-element time-delay fuses with separate spring-loaded thermal overload elements in all ampere ratings. All ampere ratings shall be designed to open at 400 degree F or less when subjected to a non-load oven test.
4. To eliminate induction heating, all fuse ferrules and end caps shall be non-ferrous and shall be bronze or other alloy not subject to stress cracking.
5. Class L Fuses: UL 198C, "High-interrupting Capacity Fuses, Current-limiting Type."
6. Class RK1 and RK5 Dual Element Time-delay Fuses: UL 198E, "Class R Fuses."

C. Fusible Switches:
1. General: UL 98 "Enclosed and Dead Front Switches" and NEMA KS-1 "Enclosed Switches," quick-make, quick-break, heavy-duty units.
2. Rating: Load-breaking capacity in excess of the normal horsepower rating for the switch.
3. Withstand Capability: In excess of the let-through current permitted by its fuse when subject to faults up to 100,000 RMS symmetrical amperes.
4. Operation: By means of external handle.
5. Interlock: Prevents access to switch interior except when in "off" position.
6. Fuse Clips: Rejection type.
7. Padlocking Provisions: For 2 padlocks whether open or closed.
8. Enclosure for Switchboard or Panel board Mounting: Suitable for panel mounting where indicated.
9. Enclosure for Switchboard Mounting: Provide individual mounting where indicated.
10. Enclosure for Independent Mounting: NEMA Type 1 enclosure except as otherwise indicated or required to suit environment where located.
11. Contacts shall be NEMA rated 75 degree C.
12. Provide fuses for safety switches and other equipment of classes, types, and rating needed to fulfill electrical requirements for services indicated.
13. Provide auxiliary contacts for disconnects supplied from variable frequency drives.

D. Safety Switches:
1. Heavy-duty type, horsepower rated for motors. Quick-make, Quick-break, load interrupter enclosed knife switch with externally operable handle. Handle shall be lockable in the "off" position.
2. Standard enclosure NEMA 1 indoors and NEMA 3R weather-tight outdoors.

E. Molded-case Circuit Breakers:
1. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."
2. Construction: Bolt-in type breakers.
3. Characteristics: Indicated frame size, trip rating, number of poles, and a short-circuit interrupting capacity rating of 10,000 amperes symmetrical for 120 and 208 volt devices and 14,000 amperes symmetrical for 277 and 480 volt devices, unless a greater rating is indicated or required to match existing devices or equipment.
4. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous over current trip protection for each pole.
5. Solid State Molded Case Circuit Breakers: Provide with electronic sensing, timing and tripping circuits for adjustable current settings; ground fault trip, instantaneous trip and adjustable short time and long time. The instantaneous shall be capable of being turned on and off on the main service breaker only.
6. Enclosure for Switchboard or Panel board Mounting: Suitable for panel mounting in switchboard or panel boards where indicated.

7. Enclosure for Switchboard or Motor Control Center Mounting: Provide individual mounting where indicated.
8. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.

F. Secondary Substation: Secondary substations are prohibited without prior approval from the university facilities.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Maintenance Stock Fuses: Refer to Section 01 78 46 – Extra Stock Materials.

B. Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions.

C. OCPDs in distribution and branch circuit equipment shall be factory installed.

D. Connections: Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

E. Grounding: Provide equipment-grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

F. Electrical panels, switchgear, and any kind of electrical distribution boards shall not be worked hot.

G. Provide a framed record drawing of the complete and final electrical distribution one-line. Mount in the main electrical room.

END OF SECTION 26 20 00

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Plug-in type devices are not acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide wiring devices of one of the following:
   1. Devices:
      a. Harvey Hubbell Inc.
      b. Leviton Mfg. Co.
      c. Pass and Seymour Inc.
      d. Bryant Electric Co.
      e. General Electric Co.
   2. Wall (Local) Switches: Numbers used below are those of Hubbell. Equivalent Cooper, P & S, or Leviton.

2.2 MATERIALS, GENERAL

A. Receptacles:
   1. Duplex receptacles shall be of the heavy-duty type, NEMA 5-20 R configurations. They shall be capable of being side or back wired, with clamp type terminals for back wiring. The grounding blades shall be aligned in such a manner that they are parallel to the longitudinal plane of the receptacle. Plus type receptacles are not permitted.
   2. All duplex, single, and special receptacles shall be heavy duty, standard grade listed by Underwriter's Laboratories, and have a single brass mounting strap with self-grounding and have a hex-head green grounding screw and be side and back wired. Each device shall bear the UL/FS Label.
   3. House Keeping Receptacles: Duplex 20-amp, color blue.
   4. Telephone or CRT Receptacles: 4 inch square box with one gang plaster ring and 5/8 inch diameter grommet hole split plate.
   5. Special Purpose Receptacles: Provide where shown on drawings. Standard grade, standard color, and of the appropriate code and NEMA configuration to match the supply circuit and load involved. Provide proper grounding through receptacle for equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify boxes are installed at proper height and openings are neatly cut and will be completely covered by wall plates.

B. Verify branch circuiting wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 INSTALLATION, GENERAL

A. Install wiring devices of type as indicated on drawings. All connections shall be made up tight and device set plumb. Use care in installing device in order to prevent damage to device and wire in outlet box. Install wiring devices as indicated, in accordance with manufacturer's written instruction, applicable

requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.

C. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.

D. Install wiring devices after wiring work has been installed and wall finishes have been completed. Install wall plates plumb and level, after painting work is completed. Provide a device plate for each outlet to suit device installed and install blank plates or covers for J-boxes and empty outlets.

E. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices or as required per UL Standards 486A.

F. Provide equipment grounding connections for wiring devices, unless otherwise indicated.

3.3 TESTING, CLEANING, AND CERTIFICATION

A. Refer to Standard Section 26 05 00 for testing, cleaning, and certification requirements.

B. Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.

C. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations.

END OF SECTION 26 27 26