Project Manual:

Indiana State University
Dreiser Hall Renovation
221 North 6th Street
Terre Haute, Indiana 47809

Volume 1
Division 00 to Division 14

Owner:

Indiana State University

Board of Trustees
210 North 7th Street
Terre Haute, Indiana 47809
812-237-7779

Owner's Project Manager

Indiana State University

Department of Facilities Management
951 Sycamore Street
Terre Haute, Indiana 47809
812-237-8100

Architect:

browning day

626 North Illinois Street
Indianapolis, Indiana 46204
Phone 317-635-5030

MEPT Engineer:

R.E. Dimond
and Associates, Inc.
Consulting Engineers
732 North Capitol Avenue
Indianapolis, IN 46204

PHONE: (317) 634-4672 FAX: (317) 638-8725

Structural Engineer:

VS ENGINEERING

4275 North High School
Indianapolis, Indiana 46254
Phone 317-293-3542

Acoustical Engineer:

DESIGN 27

1650 East 49th Street
Indianapolis, Indiana 46205
Phone 317-536-8000

Bid Number B0027086

VOLUME 1

VOLUME 2

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001000

NOTICE TO BIDDERS

Sealed proposals are requested for the Indiana State University – Dreiser Hall Renovation, Bid Number B0027086. Due to concerns for Coronavirus (COVID-19) Proposals shall be received between 1:30pm and 2:00pm local time July 1, 2020 in the lobby at the Indiana State University, Facilities Management and Purchasing Building, 951 Sycamore Street, Terre Haute, Indiana 47809. Bidders shall drop off their Bids and immediately leave the area. Do not linger in the area waiting for the Bid Opening. If you wish to submit your Bid prior to 1:30pm call 812-237-3600 to schedule someone to meet you at the main entrance door to accept your Bid. Bids will be opened and read via skype conference call at **2:30pm** Local time July 1, 2020. See Section 001010 Instructions to Bidders 1.01 B for additional Bid Submission Instructions.

Bidding Documents may be downloaded from the ISU Plan Room at http://www.indstateplanroom.com/ on **June 5, 2020** at no cost. Bidders must register for a free account the first time they access the website. Bid Documents on CD's may be ordered for purchase from Rapid Reproductions, Inc,129 South 11th Street Terre Haute, IN 47807 (812-238-1681 Toll Free 800-736-7084) at a cost of $7.50 per CD.

Proposals are to be made on the Bid Form published in the Project Manual, based on Form 96 (Revised), as prescribed by the State Board of Accounts. As a mandatory requirement the Proposal shall be accompanied by a certified check; cashier's check or a Bid Bond (AIA A310) for an amount not less than 5% of the total bid price for Base Bid(s) and all add Alternates. See Section 001010 Instructions to Bidders 3.01 for Bid Bond Requirements

Bidder(s) receiving awards shall be required to provide acceptable surety in the form of a Performance and Labor and Materials Payment Bond for the full amount of the award. Include the cost of all bonds and insurance in the bid amount.

Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid or on any Application for Payment.

All Bidders must comply with All State and Federal Non-Discrimination laws.

Responsive bidders may not have an active dispute, claim, or litigation with Indiana State University.

Indiana State University reserves the right to accept or reject any Bid and to waive any irregularities in Bidding. Any proposal received after the time fixed herein shall be returned unopened.

No bid may be withdrawn after the opening of Bids without the consent of Indiana State University for a period of One Hundred Twenty (120) days after the time of opening Bids.

A Pre-bid conference has been scheduled for 10:00am, Local Time, June 10, 2020, via Skype at https://meet.lync.com/browningday.com/jyoung/VF4BG1AU For audio only conference call, call 317-643-6269 and when prompted enter the Conference ID 903640854 followed by the #. *Representatives of each of the Bidders are strongly urged to call.*

Dreiser Hall will be open and unlocked for Bidder visits on June 9, 10, 11 and June 24, 2020 from 9:00am until 3:00pm. These will be the only opportunities for Bidders to visit the site. See Section 001010 Instructions to Bidders 1.02 B for additional site visit instructions.

Contract Award shall be to a Single Prime Bidder for all single Base Bid project work or the Contract Award may be to multiple Single Prime Bidders for multiple Base Bid Package project work. The prime Bidder(s) shall be an experienced and qualified Contractor(s) having successfully completed a minimum of three (3) projects of similar size and scope. The Bid form for this Project requires the Bidder to submit evidence of successful installation of similar projects (minimum of three projects), including customer information, scope, dates, Contract dollar amounts. With their Bid the Bidder shall submit their most current audited financial statement and vendor trade credit references as evidence of financial capability to perform the work.

NOTICE TO BIDDERS

All questions relating to this Project shall be addressed to:

Jonathan Young - Project Manager, Browning Day
Cell 317-432-5936 Office 317-613-4298 E-mail jyoung@browningday.com

INDIANA STATE UNIVERSITY BOARD OF TRUSTEES

By: Diann E. McKee
Senior Vice President for Finance and Administration and University Treasurer
Indiana State University

END OF SECTION 001000

PART 1- INSTRUCTIONS TO BIDDERS

1.01 GENERAL

A. Bidders shall carefully read the Notice to Bidders with regard to preparation of proposals, which includes the date and place for receiving proposals. See PART 3 of this Section 001010 Instructions to Bidders for a complete list of the required forms for Bidding.

B. Bid Submission Instructions

1. Due to concerns and to conform to State and Federal guidelines regarding Coronavirus (COVID-19) Proposals shall be received between 1:30pm and 2:00pm local time July 1, 2020 in the lobby at the Indiana State University, Facilities Management and Purchasing Building, 951 Sycamore Street, Terre Haute, Indiana 47809. Bidders shall drop off their Bids and immediately leave the area. Do not linger in the area waiting for a Bid Opening. There will not be a public in person meeting for the Bid Opening for this Project. If you wish to submit your Bid prior to 1:30pm call 812-237-3600 to schedule someone to meet you at the main entrance door to accept your Bidding Documents.

2. If a Bidder wishes to submit their Bid via overnight delivery the Bidder is instructed to overnight Bid (FEDEX and UPS) to the following address:

   ISU Purchasing Department
   C/O ISU Mail Room
   30 North 7th Street
   Terre Haute, IN 47807

   Overnight Bids are to **arrive before 3:00pm on June 30, 2020**.

3. The Bids will be opened at 2:30pm local time on July 1, 2020. Interested Bidders may "attend" the Bid opening via conference call on this date and time by calling 1-812-237-5920 and when prompted enter the Conference ID 6567905 followed by the #. The Bid Tabs will be posted to the plan room by noon of the day following the Bid Opening date under the Addenda Tab for the Project.

C. All Bidders shall fully inform themselves of the conditions under which the work is to be performed, the site of the work, the obstacles that may be encountered, and other relevant matters concerning the work to be performed.

D. The Contractor shall begin Work within seven (7) days after Award preparing submittals and procuring material. Actual Work shall begin on or about July 13, 2020 with all Work substantially completed by November 12, 2021. Final closeout shall be within thirty (30) calendar days thereafter. A warranty walk-thru will be held eleven (11) months from the date of substantial completion.

E. No Bidder, after being awarded the contract, shall be allowed any extra compensation for reason of their failure to fully inform themselves, prior to their Bidding, of all requirements of the Contract Documents, the Drawings, and Specifications.

F. If any Bidder for the proposed contract is in doubt as to the true meaning of any part of the Drawings, Specifications or their proposed Contract Documents, they may submit to the Owner written request for any interpretation thereof. The Bidder submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by an Addendum duly issued. A copy of such Addendum will be posted to the ISU Plan Room and e-mail notification sent to each registered plan holder (see 1.07 of this Section). Such Addendum, if any, issued before submission of the Bids, shall be taken into account and included in the proposal.

G. Any Bidder may withdraw their Bid at any time prior to the scheduled time for the receipt of bids.

H. No Bidder may withdraw their Bid or proposal for a period of One Hundred Twenty (120) calendar days after date and time set for opening Bids.

I. It is understood that the Owner reserves the right to waive any irregularities in Bidding and to accept or reject any or all Bids.

J. It is further understood on Bids with multiple Bid Packages the Owner reserves the right to selectively Award individual Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Bid Packages.

1.02 EXAMINATION OF SITE AND BIDDING DOCUMENTS

A. The site shall be carefully examined prior to bidding to ascertain the location of the work, existing conditions, and all other matters which may affect the work under this Contract. Each Bidder by making their Bid represents that they have visited the site and familiarized themselves with the local conditions under which the Work is to be performed.

B. **Dreiser Hall will be open and unlocked for Bidder visits on June 9, 10, 11 and June 24, 2020 from 9:00am until 3:00pm.** Parking shall be in ISU Parking Lot 5 at 6th and Cherry Street. These will be the only opportunities for Bidders to visit the site. Visitors shall observe established social distancing protocols and no more than two (2) persons on the elevator at any time. No Bidder, after being awarded the contract, shall be allowed any extra compensation for reason of their failure to visit the site prior to Bidding.

C. The Bidding Documents shall be carefully examined to ascertain the character, quality and quantity of the work to be performed, of materials and items to be furnished, of equipment and facilities needed during construction, of utilities and of all other matters which may affect the work under the Contract. Each Bidder by making their Bid represents that they have read and fully understands the Bidding Documents.

1.03 SPECIAL COVID-19 GUIDELINES

A. Any time a Contractor, a Subcontractor, all their employees, any Suppliers and any Delivery Persons are on the Campus of Indiana State University they shall comply with the Indiana State University rules and guidelines regarding Covid-19. These rules mirror the rules of the State of Indiana.

B. Any time a Contractor, a Subcontractor, all their employees, any Suppliers and any Delivery Persons are on the jobsite they shall comply with the rules established by the General Contractor.

1.04 PRE-BID CONFERENCE

A. A pre-bid conference will be held to answer Bidders' questions regarding the Bidding Documents.

B. An Addendum will be issued confirming any information conveyed at pre-bid conference and no verbal response tendered during pre-bid conference shall have legal standing unless so confirmed by Addendum.

1.05 BIDDING QUESTIONS

A. All questions, even if asked and answered at the pre-bid conference, shall be submitted in writing via e-mail to the Architect/Engineer/Owner.

B. The last day for questions to submitted shall be three (3) business days prior to the scheduled date for the receipt of Bids. Any questions submitted after that date may not receive consideration.

1.06 EXECUTION OF AGREEMENT

A. For all Projects the forms of agreement which the successful Bidder, as Contractor, will enter into will be an ISU Award Letter, an ISU Purchase Order and a Contract for Construction. Prior to issuance of the Purchase Order the Contractor shall provide to the Director of Purchasing the Labor and Material Performance Bond, their most current financial statement and vendor trade credit references as evidence of financial capability to perform the work and the policies of insurance or insurance certificates as required by the Contract Documents and listed in the Award Letter. All Bonds and Insurance shall have an A.M. Best rating of not less than an "A". Once all the required paperwork has been received by ISU Purchasing and the Purchase Order issued, five (5) copies the Contract for Construction Between Indiana State University and Contractor, will be mailed to the Contractor for their signature and return to the Senior Vice President for Finance and Administration for Owner signature. A fully executed copy of this Contract will be returned to the Contractor for their files.

B. Time Limits for Execution of Agreement.

1. The successful Bidder shall supply the required paperwork (their Financial Statement (if not supplied with their Bid), Certificate of Insurance and their Performance and Payment Bond) to the ISU Purchasing Department within ten (10) calendar days after receipt of the ISU Award Letter.

2. The successful Bidder shall within seven (7) calendar days after receipt of the Contract for Construction Between Indiana State University and Contractor enter into the written Contract to perform the work in accordance with the Drawings and Specifications by signing and returning the Contract to the Senior Vice President for Finance and Administration for Owner's signature and return to the Bidder.

C. In the case a Bidder whose Bid is accepted, fails to perform their Bid by providing the required paperwork within ten (10) calendar days after receipt of the Award Letter and entering into the written Contract with the Owner within seven (7) calendar days after receipt, then this failure may be cause for their certified check, draft or Bid Bond, and the proceeds thereof, to remain the absolute property of the Owner, as liquidated damages, it being impossible to estimate the amount of damages such failure would occasion.

1.07 INDEMNIFICATION

A. Bidders, in consideration of the privilege of Bidding, specifically waive all rights both legal and equitable which they have or might be construed to have against Indiana State University because of any action taken in accepting or rejecting bids and proposals, for themselves, and /or for subcontractors, suppliers and/or manufacturers, who may file an action based on any such acceptance or rejection. Bidders shall be liable for any resultant reasonable attorney fees and expenses incurred by Indiana State University.

1.08 ADDENDA

A. All Addenda for the Project will be posted on the ISU Plan Room at: http://www.indstateplanroom.com/.

B. A Bidder must register for a free account the first time they access the ISU Plan Room website.

C. The Bidder will receive an e-mail notifying that an Addendum is available for download from this site. The Bidder is advised to periodically check this link in the event an e-mail fails to deliver.

1.09 SUBSTITUTIONS PRIOR TO BID

A. Requests for substitution of any material, construction, equipment and methods named or described in the Specifications, on the Drawings and any Addenda issued shall be submitted in writing to the Architect/Engineer and Owner a minimum of seven (7)

calendar days prior to Bidding. Complete support documentation shall be provided that the item to be substituted is equal to or exceeds the material, construction, equipment or methods named or described in the Specifications, on the Drawings and any Addenda issued with the request for substitution. It is solely at the discretion of the Architect/Engineer and the Owner to allow any requests for substitution.

B. Should it be determined after Award of the Bid that the Bidder based their Bid on any material, construction, equipment and methods not named or described in the Specifications, on the Drawings and any Addenda issued as approved for substitution prior to Bidding shall be disallowed and the material, construction, equipment and methods named or described in the Specifications, on the Drawings and any Addenda issued shall be provided at no additional cost to the Owner.

PART 2 – SUBCONTRACTORS, SUPPLIER AND MANUFACTURER'S BIDS TO BIDDERS

2.01 SUBCONTRACTOR, SUPPLIER AND MANUFACTURE BUNDLING OF PRICES TO PROSPECTIVE BIDDERS

A. Subcontractors, Suppliers and Manufacturers are permitted to bundle quote prices to Bidders however these bundled prices may not be used to withhold providing individual pricing to a Bidder for bundled items when requested by a Bidder to provide individual pricing. No subcontractor or supplier shall make it a condition of their bid that another part of the project be awarded to them.

B. Failure to provide individual pricing upon Bidder's request may be cause to disqualify a Subcontractor or Supplier and Manufacturer from Indiana State University Projects.

PART 3- EXECUTION FORMS FOR BIDDING

3.01 BID BOND

A. A certified or cashier's check or Bid Bond is a mandatory requirement to be submitted with the Bid and shall be based on not less than five (5) percent of the Bid amount total of the Base Bid(s) and all add Alternates.

B. The Bid bond shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. The Bid Bond shall be obtained from surety or insurance company that is duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. In addition to appearing on Circular 570 U.S. Dept. of the Treasury, such Surety or insurance company shall maintain an A.M. Best's Rating of not less than "A.

C. Failure to submit an acceptable Bid Bond with the Bid shall disqualify a Bidder.

3.02 BIDDERS FINANCIAL STATEMENT

A. With their Bid the Bidder shall submit their most current independently audited or reviewed financial statement and vendor trade credit references as evidence of financial capability to perform the work.

B. Failure to submit the Bidder's financial statement may be cause to disqualify a Bidder.

3.03 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION (SECTION 001020 OF PROJECT MANUAL)

A. This certificate is required by the regulations implementing Executive Order 12549 Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participants' responsibilities. The regulations were published as Part V11 of the May 26, 1988 Federal Register (pages 19160-19211).

B. Submit at time of Bid. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.04 MBE/WBE/VBE PARTICIPATION PLAN. (SECTION 001040 OF THE PROJECT MANUAL)

A. See Section 001030 MBE/WBE/VBE COMPLIANCE INSTRUCTIONS for full details on submission of the Participation Plan.

B. This Plan must be submitted at time of Bid by **all Bidders**. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.05 MANDATORY TIER II REPORTING REQUIREMENT FOR PROJECTS EQUAL TO OR GREATER THAN $500,000.00. (Note: this form may not be included in all Project Manuals)

A. MBE/WBE/VBE utilization in the performance of this Contract must be reported with each Application for Payment using the ISU Business Diversity Spend Reporting Form for Construction/Renovation/Facilities Repair Projects (see included: Tier II Spend Report Form.xlsx.)

B. Compliance with Owner's Mandatory Tier II Reporting Requirement is a condition for the approval of an Applications for Payment.

C. An electronic copy in Excel format will be included with the Award Letter when applicable.

3.06 BIDDER'S CERTIFICATION OF A**U**THORIZED EMPLOYMENT (SECTION 001045 OF THE PROJECT MANUAL)

A. Bidder must certify at time the of Bidding that they have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents In Section 002011 Amendments to General Conditions Article 13, subparagraph 13.1.7.3 and its subparagraphs

B. Submit at time of Bid. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.07 BID FORM (SECTION 002000 OF THE PROJECT MANUAL)

A. In order to receive consideration, make all Bids in strict accordance with the following:

1. Proposals shall be submitted only on the form furnished, a copy of which is bound into and forms a part of this Project Manual, and which will become a part of the Purchase Order Contract of the successful Bidder (use a photocopy of the Bid Form herein).

2. Proposals shall be completely and correctly filled out using ink or typewriter, with signatures in ink.

3. Prices, except unit prices and percentages, shall be stated both in figures and in writing. In the event of a discrepancy between writing and the figures, the written amount shall govern.

4. Proposals shall be signed by the Bidder, by a partner, or a duly authorized officer for a corporation, and shall give the Bidder's business address and telephone number. Failure to sign the Bid form may be cause to disqualify a Bid.

5. Proposals submitted by non-Indiana corporations shall be accompanied by a certificate of good standing issued by the Indiana Secretary of State.

6. Any interlineation, alteration or erasure of the published Bid Form may be grounds for rejection of the proposal. Proposal shall contain no recapitulation of the work to be done.

7. Proposals shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Sections for substitution request requirements.

B. Modification of proposals already submitted will be accepted by letter, fax or telegram if received by the Owner prior to the date and hour set for opening of proposals.

C. Each Bid shall be addressed to the Owner, and shall be delivered to the Office of the Director of Purchasing at the address given in the Notice to Bidders on or before the day and hour set for opening of Bids. Each Bid shall be enclosed in a sealed envelope bearing the title of the Project, the name of the Bidder, and the date and hour of the Bid opening. It is the sole responsibility of the bidder to see that their bid is received on time.

3.08 ADDENDA

D. Indicate receipt of Addenda on the Bid Form in the spaces provided for acknowledgement.

E. Failure to indicate receipt may be cause to disqualify a Bid.

3.09 BID FORM - BASE BID(S)

A. Base Bid(s) shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Section for substitution request requirements.

B. On Bids with multiple Base Bid Packages the Owner reserves the right to selectively Award individual Base Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Bid Packages.

3.10 BID FORM - ALTERNATE BID(S)

A. Each Bidder, in addition to submission of the Base Bid, shall submit a Bid for any Alternate(s) as called for (if any). Failure to submit said Alternate Bid(s) shall be sufficient cause for the Owner to reject any proposal in its entirety. Also the Owner may consider the Alternate Bid in awarding of a Contract, but is under no obligation to accept any Alternate Bid.

B. Proposals shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Section for substitution request requirements.

3.11 BID FORM – ALLOWANCES

A. Allowances (if any) shall be included in the applicable Bid (Base Bid(s) or Alternate Bid(s)) as called for in the Allowance Section of the Bid Form and/or Section 012360 Allowances.

B. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to an Allowance.

C. Any unused portion of an Allowance shall be returned to the Owner at Contract Closeout.

3.12 NON-COLLUSION AFFIDAVIT

A. The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any

kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

B. Submission of the signed Bid Form indicates compliance.

3.13 NON-DISCRIMINATION

A. The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract.

B. Submission of the signed Bid Form indicates compliance.

3.14 CERTIFICATION OF UNITED STATES STEEL PRODUCTS

A. The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

B. Submission of the signed Bid Form indicates compliance.

3.15 BID FORM - APPENDIX A SUBCONTRACTOR AND SUPPLIER/MANUFACTURERS LISTS

A. The Prime Contractor (Bidder) shall list all Subcontractors and Suppliers/Manufacturers called for in Appendix A of the Bid Form at the time of Bid Submission. Failure to provide this information may be sufficient cause to disallow a Bid.

B. **The Prime Contractor (Bidder) shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix "A" submitted at the time of Bid. It is the Prime Contractor's (Bidder's) responsibility to assure they have listed the correct Subcontractors, Suppliers, Materials and Equipment on their Bid Form. THERE SHALL BE NO CHANGES PERMITTED TO THESE LISTS.**

1. Exception: If the Architect/Engineer or Owner determines the Subcontractors, Suppliers, Materials or Equipment are not acceptable, the Owner shall notify the Prime Contractor (Bidder) in writing within two (2) working days after receipt of Bids of the unacceptable Subcontractor(s), Supplier(s), Material(s) and/or Equipment(s).

3.16 BID FORM - APPENDIX B UNIT PRICES

A. Each Bidder shall submit pricing for Unit Prices as called for (if any) in Appendix B. Failure to submit said pricing may be sufficient cause for the Owner to reject any proposal in its entirety. Also the Owner may consider the Unit Pricing in awarding of a Contract.

B. Unit Prices shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding.

C. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

3.17 APPENDIX C COMPREHENSIVE SUBCONTRACTOR AND SUPPLIER & MANUFACTURER LISTS

A. Included with Section 002000 Bid Form is a comprehensive listing of Subcontractors and Suppliers & Manufacturers. This list shall be submitted within twenty four (24) hours after the Bid opening. **THERE SHALL BE NO CHANGES PERMITTED TO THESE LISTS ONCE SUBMITTED.**

1. Exception: If the Architect/Engineer or Owner determines the Subcontractors, Suppliers, Materials or Equipment are not acceptable, the Architect shall notify the

Prime Contractor (Bidder) in writing within two (2) working days after receipt of Appendix C of the unacceptable Subcontractor(s), Supplier(s), Material(s) and/or Equipment(s).

B. Submit Appendix C via e-mail to the following individuals:

1. Jonathan Young jyoung@browningday.com
2. Greg Jacoby gjacoby@browningday.com
3. Mike Bonnett Mike.Bonnett@indstate.edu,
4. Bryan Duncan Bryan.Duncan@indstate.edu,
5. Pat Teeters patrick.teeters@indstate.edu

3.18 BID FORM - APPENDIX D

A. By 2:00pm on the next business day after receipt of Bids the Bidder shall submit, a wage rate schedule for the workers of the Prime Bidder and all major Subcontractors involved in the Work. The wage rate shall include the worker's hourly rate plus all fringe benefits to be paid to the worker.

B. A major Subcontractor is defined as any Subcontractor whose portion of the Bid is in excess of $250,000 or 20% of the total Bid whichever is less.

C. Failure to submit this wage rate schedule within the allotted time may be sufficient cause to disallow a Bid. The wage rates provided may be used as a basis for Award of the Bid.

D. The Owner reserves the right to require certified payroll records to be provided to verify the wage rates listed on the wage rate schedule are accurate.

END OF SECTION 001010

CERTIFICATION REGARDING SUSPENSION, DEBARMENT, INELIGIBILITY AND VOLUNTARY EXCLUSION

This certificate is required by the regulations implementing Executive Orders 12549 and 12689, Uniform Guidance 2 CFR 200.213 and 2 CFR 180 sections regarding Suspension and Debarment

Is your organization, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

Are any of your subcontractors, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

_____
Your Company's Name

_____
Signature

_____
Print Your Name

_____
Date

END OF SECTION 001020

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PART 1 – CONSTRUCTION SERVICES – INSTRUCTION TO BIDDERS

1.01 MBE/WBE/VBE Participation Plan

A. Indiana State University is committed to diversity and non-discrimination in all aspects of its operations. This initiative is to ensure that certified MBEs, WBEs, and VBEs are included in all invitations for quotes and bids, and that all prospective bidders are notified of Indiana State University's expectation for diversity, including but not limited to MBE/WBE/VBE participation in procurement contracts for professional services, materials, supplies and equipment, and in contracts for the construction, architectural services, renovation or repair of university facilities and equipment. This expectation extends to all tiers of contractor utilization. Each Prime contractor should actively solicit and include certified minority, women and veteran owned subcontractors in bid submissions if economically feasible.

B. The Minority, Women's and Veteran's Business Enterprise Participation Plan (form included in specifications) shall be submitted with the bid. This Participation Plan will be considered during the proposal evaluation process.

C. Indiana State University's annual MBE, WBE, and VBE participation goals parallel those set by the Indiana Department of Administration for its own business diversity efforts. The State MBE/WBE participation goals may be found at www.in.gov/idoa/mwbe/2743.htm and VBE participation goals may be found at www.in.gov/idoa/2862.htm

1.02 Definitions

A. "Minority-owned Business Enterprise" (MBE) means an individual, partnership, corporation, limited liability company, or joint venture of any kind that is 51% owned and controlled by (1) or more persons who are (a) United States citizens; and (b) members of a racial minority group: African American, American Indians, Hispanics, Asian Americans, or other similar minority group as defined by 13 CFR 124.103 and have been certified by the State of Indiana.

B. "Women-owned Business Enterprise" (WBE) means an individual, partnership, corporation, limited liability company, or joint venture of any kind that is 51% owned and controlled by (1) or more persons who are (a) United States citizens; and (b) whose gender is female and have been certified by the State of Indiana.

C. "Veteran-owned Business Enterprise" (VBE) means an Indiana firm with its principal place of business location in Indiana and is currently certified by the Department of Veterans Affairs as a veteran-owned business and have been certified by the State of Indiana or who have been Federally certified.

1.03 Qualifications for Participation

A. In order to count toward participation goals, the MBEs and WBEs must be certified by the State of Indiana.

B. VBEs must be certified by the State of Indiana or have been Federally certified.

1.04 Failure to Participate

A. Failure to submit the Minority, Women's and Veteran's Business Enterprise Participation Plan with the Bid may be cause to reject a Bid.

B. The Owner retains the right to hold payment, and/or to reject future bids submitted by the successful Contractor in the event that Contractor misrepresents either MBE/WBE/VBE participation in this Project, or its efforts to obtain MBE/WBE/VBE participation in this project, or fails to report MBE/WBE/VBE spend on this project.

C. The Owner, at its discretion, may waive in part or in whole the minority-owned business enterprise, women-owned business enterprise and/or veteran-owned business enterprise requirement if in the opinion of the Owner it would be impractical, or not in the best interest of the Owner.

1.05 Mandatory Tier II Reporting Requirement for Projects equal to or greater than $500,000.00

A. The successful Contractor shall take all necessary and reasonable steps to ensure that MBE/WBE/VBEs have the maximum opportunity to compete for and perform work on this Contract.

B. MBE/WBE/VBE utilization in the performance of this Contract must be reported with each Application for Payment using the ISU Business Diversity Spend Reporting Form for Construction/Renovation/Facilities Repair Projects (see included: Tier II Spend Report Form.xlsx.)

C. Compliance with Owner's Mandatory Tier II Reporting Requirement is a condition for the approval of an Applications for Payment.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 001030

001040
MBE/WBE/VBE PARTICIPATION PLAN

Project Name _____

Bid Number _____ Bid Date _____

This Form must be completed by all Bidders and submitted with the Bid. **Failure to submit may be cause to reject the Bid.**

Check if Bidder is an MBE, WBE or VBE

Bidders Firm _____ MBE ☐ WBE ☐ VBE ☐

Address _____

City/State/Zip _____

Phone _____

E-mail _____

The following certified minority, women and/or veteran -owned firms will be participating in the project according to the following schedule. Indicate whether each firm is an MBE, WBE or VBE by selecting the MBE, WBE or VBE box below.

1. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

2. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

3. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

4. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

If more space is need attach additional sheet

If no MBE, WBE or VBE contractors are listed above please indicate reason(s) why:

☐ Unable to locate any MBEs, WBEs or VBEs.

☐ Unable to secure competitive pricing from any MBEs, WBEs or VBEs.

☐ Other reasons, please describe: _____

MBE/WBE/VBE PARTICIPATION PLAN

Describe below your efforts to obtain minority, women and veteran's business enterprise participation for this project.
Be sure to attach a copy of all solicitation efforts, e.g., ads that were published or networking events, etc.

_____

_____

_____

_____

List below the MBE/WBE/VBE contractors you individually contacted to request a quote for this project. If all work is to be self-performed and your Firm is not MBE, WBE or VBE list N/A in top left line below.

MBE, WBE, VBE Firms Contacted

Check all that apply:

1. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

2. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

3. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

4. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

If more space is need attach additional sheet

By my signature, I certify that the above statements are true and accurate, all as of the date below. I also understand that any changes to this plan must be approved by Indiana State University and documented by Construction Change Directive.

Agent of Bidder _____

Date _____

END OF SECTION 001040

BIDDER'S CERTIFICATION OF AUTHORIZED EMPLOYMENT

In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

The Prime Contractor shall require their subcontractors who perform work under this Contract to certify to the Prime Contractor that the subcontractor does not knowingly employ or contract with an unauthorized alien and that the subcontractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor. The successful Prime Contractor and its sub-contractors at all levels shall comply with all provisions of the statute or the Contract is subject to cancellation.

I hereby certify that I have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents In Section 002011 Amendments to General Conditions Article 13, subparagraph 13.1.7.3 and its subparagraphs and that the undersigned and proposed and actual sub-contractors at all tiers shall comply with the provisions of the Statute

On behalf of and as authorized by the Bidder, I affirm and depose that the Bidder and our Subcontractors shall not knowingly employ unauthorized aliens.

_____

(Bidder - Please print full name of your proprietorship, partnership, or corporation)

_____

(Name - Authorized Signing Officer)

_____

(Title)

_____

(Signature)

_____

(Date)

END OF SECTION 001045

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Indiana State University

Office of the Senior Vice President for
Finance and Administration and University Treasurer
Rankin Hall Suite 210
210 North 7th Street
Terre Haute, Indiana 47809

Contract for Construction Between Indiana State University and Contractor

ISU Form CfC101-15
Based on AIA Form A101

AGREEMENT

Agreement for the Contract of Construction made as of the _____ day of _____ in the year of Two Thousand and _____

BETWEEN the Owner
Indiana State University
210 North Seventh Street
Terre Haute, Indiana 47809-0001

and the Contractor:
(Name and address)

Project is:
(Name and location)

The Architect/Engineer is:
(Name and address)

Indiana State University and the Contractor agree as set forth below:

Part 1 – Contract Documents:

The Contract Documents include this Contract for Construction, Conditions of the Contract (General and Special Conditions), Drawings, Specifications, Addenda issued prior to execution of this Contract, other documents listed in this Contract, and Modifications issued after execution of this Contract; these form the Contract, and are as fully a part of the Contract as if attached to this Contract or repeated herein. This Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representation or agreements, either written or oral. An enumeration of the Contract Documents and other Modifications appears in Part 9 of this document.

Part 2 – Work of This Contract:

The Contractor shall execute the entire work as described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others, or as follows:

Part 3 – Start Date and Substantial Completion Date:

3.01 The Start Date shall be as indicated in Section 001010 of the Project Specifications, as listed in any subsequent Addenda, the Award Letter or as listed below:

3.02 The Contractor shall achieve Substantial Completion as indicated in Section 001010 of the Project Specifications, as listed in any subsequent Addenda, the Award Letter or as listed below:

3.03 Substantial Completion may be adjusted as allowed under Contract Documents or as mutually agreed upon in writing by the Owner and the Contractor.

Part 4 – Contract Sum:

4.01 Indiana State University shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of _____dollars ($_____) subject to additions or deductions as provided in the Contract Documents

4.02 The Contract Sum is based upon the following Alternates, if any, which are described in the Contract Documents and are hereby accepted by Indiana State University:

4.03 Unit Prices, if any, are as follows:

4.04 Allowances

Part 5 – Progress Payments

5.01 Based on an Application for Payment Issued to the Architect/Engineer by the Contractor, Indiana State University shall make progress payments on the account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

5.02 The period covered by each Application for Payment shall be on a regular monthly basis of not less than Twenty Eight (28) calendar days.

5.03 When the Application for Payment is received by the Architect/Engineer, Indiana State University shall make payment within fifteen (15) days after the approval of the Application for Payment by the Architect/Engineer and receipt by Indiana State University Office of Finance and Administration.

5.04 Each Application for Payment shall be based on the schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of Work and shall be prepared in a form and supported by such data as required by the Architect/Engineer and Indiana State University to evaluate and substantiate the accuracy of the Application for Payment. Unless objected to by the Architect/Engineer or Indiana State University this schedule of values shall be the basis for all Contractor Applications for Payment.

5.05 Applications for Payment shall indicate the percentage of completion of each portion of Work as of the end of the application period.

5.06 A Partial Waiver of Lien shall be included with each progress Application for Payment.

5.07 Subject to provisions of the Contract Documents, the amount of the Application for Payment shall be computed as follows:

A. Total of all portions of Work indicted on the schedule of values completed during the application period.

B. Total of verified stored materials indicated on the schedule of values acquired during the application period, provided proof of insurance on the storage facility is submitted.

C. Total of all Change Orders approved or Change Directives issued during the application period.

D. Less a Retainage of ten percent (10%)

E. Subtract the aggregate of previous Applications of Payments made to Indiana State University and subtract amounts, if any, withheld or nullified by the Architect/Engineer.

5.08 The progress payment amount determined by Section 5.06 shall be further modified under the following circumstances

A. Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to ninety five percent (95%) of the Contract Sum; less any amounts the Architect/Engineer or Indiana State University shall determine for incomplete work and unsettled claims.

B. Add, if final completion of the work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Subparagraph 9.10.3 of the General Conditions.

5.09 Reduction or Limitation of Retainage:

A. At the sole written discretion of Indiana State University, if acceptable progress is made, at fifty percent (50%) completion of the Contract Sum the remaining Retainage may be reduced to 0%.

Part 6 – Final Payment

6.01 Final payment, constituting the remaining unpaid balance of the Contract Sum, shall be made to the Contractor by Indiana State University when:

A. The Contract has been fully performed by the Contractor as detailed in the Contract Documents.

B. Approval of the Final Application for Payment is received from the Architect/Engineer.

6.02 No Contractor claims for additional compensation shall be permitted or accepted more than sixty (60) days following the Contractor's submission of their Final Application for Payment.

6.03 Payment shall be made by Indiana State University 61 days after issuance of the of the Contractor's Final Application for Payment and Final Waiver of Lien and final approval from the Architect/Engineer of the Final Application for Payment.

Part 7 – Miscellaneous Provisions

7.01 Where reference is made in this document to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

Part 8 – Termination or Suspension

8.01 The Contract may be terminated by Indiana State University or the Contractor as provided in Article 14 of the General Conditions.

8.02 The Work may be suspended by Indiana State University as provided in Article 14 of the General Conditions.

Part 9 – Enumeration of Contract Documents

9.01 The Contract Documents, except for Modifications issued after execution of this Contract, are enumerated as follows:

A. The agreement is this executed **Contract for Construction Between Indiana State University and Contractor, ISU Form CfC101-17**.

B. The General Conditions are the General Conditions of the Contract for Construction, AIA Document A201.

C. The Supplementary and Other Conditions are those contained in the Project Specifications and are as follows:

See attached Exhibit A Sections 00 and 01

D. The Specifications:

See attached Exhibit A Sections 02-33 as applicable

E. The Drawings:

See attached Exhibit B

F. The Addenda:

Number	Date	Pages

G. Other Documents, if any, forming the Contract Documents are as follows:

Debarment Form, Diversity Compliance Form, Contractor's Certification of Authorized Employment Form, Award Letter, Purchase Order

This agreement is entered into as of the day and year first written above and is executed in at least five (5) copies of which one is delivered to the Contractor, one is delivered to the Architect/Engineer, and the remainder to Indiana State University for distribution to the ISU Purchasing Department, the Office of the Senior Vice President for Finance and Administration and the ISU Facilities Management Department.

Indiana State University	Contractor
_____	_____
(Signature)	*(Signature)*
Diann E. McKee	_____
(Printed or Typed Name)	*(Printed or Typed Name)*

002000
BID FORM

BASED ON BID FORM
FORM NO. 96
REVISED FORMAT 1/14/2013

GENERAL BID FOR PUBLIC BUILDING

PROJECT: **Dreiser Hall Renovation Bid # B0027086**

TO: INDIANA STATE UNIVERSITY
BOARD OF TRUSTEES
TERRE HAUTE, INDIANA

FROM:

_____
(Name of Bidder) (Company Name)

_____
(Address)

_____
(City, State, Zip)

PHONE NUMBER _____

DATE: _____

SUBMITTED BY: _____ _____
(Signature) (Title)
The Bidder's signature certifies the Bidder is in compliance with all aspects of the Bid Documents

ADDENDA
The following Addenda have been received. The modifications to the bidding documents noted therein have been considered and all costs thereto are included in the Bid Sum(s).

Addendum #_____ Dated _____
Addendum #_____ Dated _____
Addendum #_____ Dated _____
Addendum #_____ Dated _____

OWNER'S RIGHTS REGARDING ACCEPTANCE OF BIDS
It is understood that the Owner reserves the right to accept or reject any Bid and to waive any irregularities in Bidding. It is further understood on Bids with multiple Base Bid Packages the Owner reserves the right to selectively Award individual Base Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Base Bid Packages.

TAX EXEMPT
Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid. All other applicable Federal, State and Local taxes shall be included in the Bid sum. Tax exempt certificate available upon request.

OFFER:
Pursuant to and in compliance with 'Instructions to Bidders', and other Bidding Documents prepared by the Indiana State University Facilities Management Department for the above mentioned project, the signer, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the Work within the time stated and in strict accordance with the intent of the proposed Contract Documents, including furnishing bonds, insurance, labor, materials, and to do all the Work required to construct and complete in accordance with the proposed Contract Documents as follows:

BASE BID: Indiana State University Dreiser Hall Renovation per Specifications and Drawings.

_____ Dollars ($_____)
(State Amount in Words)

ALTERNATE BIDS

1. Alternate No. 1: Add operable function for exterior windows.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

2. Alternate No. 2: Add portions of wood paneling on 2nd and 3rd floors.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

3. Alternate No. 3: Add masonry restoration work. Refer to Building Elevation Drawings for Areas of Restoration

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

4. Alternate No. 4: Add pipe grid, curtain, mirror, and associated theatrical lighting in Room 016 – Performance and Technology Lab.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

5. Alternate No. 5: Add work associated with opening up Stair #2.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

6. Alternate No. 6: Add select areas of glazed wall system on 1st and 3rd floors.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

7. Alternate No. 7: Add reroofing work.

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

8. Alternate No. 8: Add stage lift

_____ Dollars ($_____)
(State Amount in Words) Add ☐ Deduct ☐

ALLOWANCES

1. A $20,000 Allowance shall be included in the Base Bid for the A/E to create “Record Drawings” as detailed in Section 017700 Contract Closeout.
2. A $300,000 Allowance shall be included in the Base Bid for Unforeseen Conditions and General Construction Contingency. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to this Allowance.

ACCEPTANCE
This offer shall be opened to acceptance and is irrevocable for the period as follows:

- Base Bid and All Alternates - One Hundred Twenty (120) calendar days from the Bid opening date.

If the Owner accepts the Bid within the time period stated above, Bidder will:

- Furnish the required bonds and insurance certificates within ten (10) calendar days of receipt of the Award Letter
- Commence work within seven (7) calendar days of receipt of the Award Letter or as Directed by the Owner.
- Execute the Contract for Construction Between Indiana State University and Contractor within seven (7) calendar days of receipt of the Contract.

The Bidder agrees to coordinate and expedite their work and that if the Award is given within fourteen (14) calendar days from the Bid opening date the work shall be substantially completed as listed in Section 001010 Instructions to Bidders 1.01 C. If the Award is not made within the stated fourteen (14) calendar days then the substantial completion date may be adjusted as allowed by the Contract Documents or as mutually agreed upon in writing by the Owner and Contractor.

NON-COLLUSION AFFIDAVIT

The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

NON-DISCRIMINATION

The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract.

CERTIFICATION OF UNITED STATES STEEL PRODUCTS

The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

MBE/WBE/VBE BIDDING:

See Section 001030 for requirements for MBE/WBE/VBE Compliance. Section 001040 MBE/WBE/VBE Participation Plan must be completed by **all Bidders** and submitted with the Bid. Failure to submit with the Bid may be sufficient cause to disqualify a Bid.

EXPERIENCE QUESTIONNAIRE

List similar projects completed by your organization:

1. Contract Amount _____

   Description _____

   Date Completed _____

   Owner_____
   (Name and phone #)

2. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

List similar projects currently under construction by your organization

1. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

2. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

Yes ☐ No ☐ Has your organization ever failed to complete any work awarded it?

If yes, where and why?

_____

_____

_____

Yes ☐ No ☐ Does your Organization have any pending litigation or litigation completed within the past five (5) years initiated by your Organization or the Owner as a result of your work on another Project?

If yes, attach a complete listing, with your Bid, of all such litigation(s) and name(s) of Institutions and/or Parties involved with complete contact information. Failure to submit this information may result in disqualification of your Bid.

Yes ☐ No ☐ Has your Organization been cited for violation of State or Federal regulations within the past twelve months?

If yes, what was the violation and resolution?

_____

_____

_____

List references from firms for which your organization has performed work. Provide firm name, contact person name and phone number.

_____

_____

_____

APPENDICES

The following Appendices are submitted with the Bid:

Appendix A - Subcontractors and Supplier & Manufacturer Lists

Appendix B - Unit Prices

Appendix C - Complete Subcontractor and Supplier & Manufacturer Lists to be submitted within 24 hours after Bid.

Appendix D - Wage Rate Schedules

OATH AND AFFIRMATION

Attested to this ____ day of _____, 201____

By _____

ACKNOWLEDGMENT

State of _____
SS:

County of _____

_____ being duly sworn, deposes and
(Name of person)

says that he/she is _____ of
(Title)

_____ and that the
(Name of organization)
statements contained in the foregoing bid, certification and affidavit are true and correct.

Subscribed and sworn to before me by _____

this _____ day of _____, 201___

_____
Notary Public

My Commission Expires _____

County of Residence _____

SUPPLEMENTS TO BID FORM

TO: INDIANA STATE UNIVERSITY

PROJECT: **Dreiser Hall Renovation Bid # B0027086**

DATE: _____

SUBMITTED BY:
(full name)

(full address)

In accordance with Instructions to Bidders and Bid Form, we include the Supplements to Bid Form for Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

Appendix A - Subcontractor and Manufacturers List (to be submitted at time of Bid)
Failure to submit may be cause to disqualify bid

_____
(Bidder)

_____
(Project)

The following will be performed (or provided) by the Subcontractors and Manufacturers listed herein and coordinated by us.

The Prime Contractor (Bidder) shall list all Subcontractors and Suppliers/Manufacturers called for in Appendix A of this Bid Form at the time of Bid Submission. Failure to provide this information may be sufficient cause to disallow a Bid.

The Prime Contractor (Bidder) shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix "A" submitted at the time of Bid. It is the Prime Contractor's (Bidder's) responsibility to assure they have listed the correct Subcontractors, Suppliers, Materials and Equipment on their Bid Form. THERE SHALL BE NO CHANGES PERMITTED TO THESE LISTS.

Exception: If the Owner determines the Subcontractors, Suppliers, Materials or Equipment are not acceptable, the Owner shall notify the Prime Contractor (Bidder) in writing within two (2) working days after receipt of Bids of the unacceptable Subcontractor(s), Supplier(s), Material(s) and/or Equipment(s).

(Listings begin on next page)

APPENDIX A – SUBCONTRACTOR LIST

Bidder shall provide the names of all applicable Subcontractors

Description	Subcontractor
Steel Fabricator	_____
Steel Erector	_____
Curtain Wall / Storefront	_____
Concrete Work	_____
Masonry Work	_____
Roofing Work	_____
Electrical Work	_____
IT (Voice Data) Work	_____
Sheet Metal Work	_____
Mechanical	_____
Temperature Control	_____
Plumbing Work	_____
FP Sprinkler Work	_____
Site Work	_____

APPENDIX A – SUPPLIER & MANUFACTURERS LIST

Bidder shall provide the names of all applicable Suppliers and Manufacturers

Product Description	Supplier	Manufacturer
Roofing System (Alternate Bid)	_____	_____
Elevator	_____	_____
Heat Exchanger	_____	_____
Built-up AHU (AHU 1)	_____	_____
Modular CSAC (AHU 2)	_____	_____
Mini-Split Units	_____	_____
Pumps	_____	_____
VAV Boxes	_____	_____

Exhaust Fans	_____	_____
Panelboards	_____	_____
Switchboards	_____	_____

Appendix B – Unit Prices

1. Unit Price #1 Repointing Materials and Labor per square foot of brick repointing. $_____ sq ft

2. Unit Price #2 Plaster Patching Materials and Labor per square foot of plaster patching. $_____ sq ft

Rest of page left intentionally blank

Appendix C – <u>To be submitted within 24 hours after Bids received.</u> See Section 001010 Instructions to Bidders 3.17 for further instructions

APPENDIX C – SUBCONTRACTOR LIST

Bidder shall provide the names of all the applicable Subcontractors with the Bid.

Description	Subcontractor
Ceiling Work	
Flooring Work	
Terrazzo Restoration	
Painting Work	
Testing (Electrical)	
Audio/Visual	
Theatrical Lighting / Integrator	
Theatrical Rigging	
Fire Alarm Installer	
Testing and Balancing (Mechanical)	
Irrigation Work	
Landscaping Work	
Sedimentation Control	

APPENDIX C – SUPPLIER AND MANUFACTURER'S LIST

Bidder shall provide the names of all applicable Suppliers and Manufacturers

Product Description	Supplier	Manufacturer
Ceiling: Grids		
Ceiling: Panels		
Flooring: Tile		
Flooring: Carpet		
Hollow Metal Frames		
Doors		
Door Hardware		

Signage	_____	_____
Hydraulic Cement	_____	_____
Aluminum Entrances and Storefronts	_____	_____
Windows	_____	_____
Operable Windows (Alternate)	_____	_____
Plumbing Fixtures and Trim	_____	_____
Plumbing Faucets	_____	_____
Grilles & Diffusers	_____	_____
Fire Alarm	_____	_____
Wiring Devices	_____	_____
Lighting	_____	_____
Lighting Controls	_____	_____
Theatrical Lighting Controls	_____	_____
Theatrical Lighting Fixtures	_____	_____

Appendix D – Wage Rate Schedules

By 2:00pm on the next business day after receipt of Bids the Bidder shall submit, a wage rate schedule for the workers of the Prime Bidder and all major Subcontractors involved in the Work. Failure to supply the wage rate schedule(s) as required by the Bidding Documents may be sufficient cause to disallow a Bid

END OF SECTION 002000

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DRAFT AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
« »
« »

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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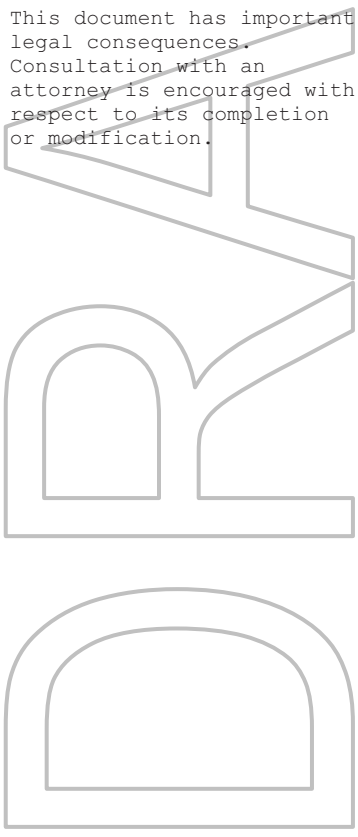

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(Topics and numbers in bold are section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner 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 as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 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, falsework, 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.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. 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.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

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

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

PART 1 – GENERAL

1.01 AMENDMENTS TO GENERAL CONDITIONS

A. The General Conditions for this Project shall be the American Institute of Architects' Document A201-2007, "General Conditions of the Contract for Construction, Articles 1 through 15, inclusive, 38 pages, and hereafter referred to as the "General Conditions." Such document is specifically made a part of the Contract Documents.

B. The following amendments shall modify, delete, and supplement the General Conditions. Where any Article, Paragraph, or Subparagraph in the General Conditions is supplemented by one of the following Paragraphs, the provisions of such Article, Paragraph, or Subparagraph shall remain in full force and effect and the supplemental provisions shall be considered as added thereto. Where any Article, Paragraph not so amended, deleted, voided, or superseded shall remain in full force and the order and numbering of subsequent articles, Paragraphs or Subparagraphs shall be changed to read as if in sequence.

C. Refer to other Division 00 documents for additional supplemental requirements.

PART 2 – AMENDMENT ARTICLES

2.01 ARTICLE 1

A. Subparagraph 1.1.1: Amend this Subparagraph by deleting the last sentence beginning with the words "Unless specifically enumerated" and substituting the following sentence: "The Contract Documents shall also include the Notice to Bidders, Instructions to Bidders, Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion, Bid Form, Subcontractors and Materials Listing, Contractor's Non-Collusion Affidavit, and all portions of Addenda relating to Bidding Requirements."

B. Add the following Subparagraph 1.1.7

"1.1.7 ARCHITECT/ENGINEER"

"Where the word Architect is used in the AIA A201-2007 it shall be inferred to also include the Design Engineer(s), e.g. Architect/Engineer, Engineer (for Engineer only Administered Projects).

C. Add the following Section 1.7

"1.7 LITIGATION

1.7.1 All litigation under this Contract must be initiated in Vigo County, Indiana and Contractor consents to the jurisdiction of the Vigo County courts.

1.7.2 Contractor hereby waives its right to a jury trial in any matters litigated in Vigo County.

1.7.3 In any litigation initiated by Contractor, Contractor shall reimburse all attorney's fees and expenses incurred by Owner up to a maximum of $100,000 provided Contractor has presented its claims as required by this Contract and the Owner has made a good faith offer to resolve any dispute prior to litigation. The determination of a 'good faith offer' shall rest solely with the Architect who will render their opinion in writing to Contractor or Owner upon request prior to Contractor initiating litigation or thereafter as requested. The Architect's decision is binding on Owner and Contractor and admissible in court as determinative of this issue.

1.7.4 In any litigation initiated by Owner against Contractor, provided Contractor was given the opportunity to resolve all issues prior to litigation being initiated and failed to do so through a reasonable offer, as determined by the Architect, then Contractor shall be responsible to reimburse all attorney's fees and expenses incurred by Owner for all litigation as well as for all pre-litigation activities engaged in by the Owner for

investigating, evaluating, or mediating any claims, issues, or matters related to Contractor."

2.02 ARTICLE 2

A. Subparagraph 2.1.2: Delete this Subparagraph in its entirety.

B. Subparagraph 2.2.5: Amend this Subparagraph by adding "electronically" after the word Documents in the second line.

2.03 ARTICLE 3

A. Paragraph 3.2: Amend this Paragraph by deleting Subparagraph 3.2.1 in its entirety and replacing with the following new subparagraph 3.2.1 and its subparagraphs:

"3.2.1 By executing the Contract, the Contractor represents to the Owner that:"

"3.2.1.1 The Contractor has a high level of experience and expertise in the business administration construction, management, workplace health and safety supervision and superintendence of projects of similar size and complexity and that it will perform the Work with the care, skill and diligence of such a contractor."

"3.2.1.2 Contractor and, to the best of its knowledge, its subcontractors are financially solvent, able to pay all debts as they mature and have sufficient working capital to complete the Work and all obligations thereunder."

"3.2.1.3 The Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work."

"3.2.1.4 Contractor is authorized to do business in the State of Indiana."

"3.2.1.5 Contractor's execution of the Contract and its performance thereof are within its authorized powers."

"3.2.1.6 Contractor has:"

"3.2.1.6.1 Studied the Contract Documents, understands their provisions and that that they are sufficiently detailed and complete to permit the Contractor to perform the Work in accordance with the Contract Documents, within the Contract Time and for the Contract Sum."

"3.2.1.6.2. Inspected the Project site."

"3.2.1.6.3 Investigated and satisfied itself as to:

"3.2.1.6.3.1 The site and locality where the Work is to be performed and the conditions and difficulties to be encountered, including access thereto."

"3.2.1.6.3.2 The availability of utilities and access thereto."

"3.2.1.6.3.3 Conditions affecting transportation, disposal, handling and storage of materials, supplies and equipment."

"3.2.1.6.3.4 Any materials, supplies or equipment which are to be furnished by the Owner for the Contractor's use."

"3.2.1.6.3.5 The type and availability of tools, equipment and facilities to perform the Work."

"3.2.1.6.3.6 The availability and adequacy of labor and trades, and, if applicable, union wage scales, benefits, working conditions, craft jurisdictions, area practices and collective bargaining agreements affecting the Work."

"3.2.1.6.3.7 Prevailing weather and climatological conditions."

"3.2.1.6.3.8 All laws applicable to the Work and to the Contractor."

"3.2.1.6.3.9 All other factors which may affect the Contractor's performance of the Work."

B. Paragraph 3.4: Amend this Paragraph by adding Subparagraphs 3.4.4 through 3.4.7 as follows:

"3.4.4 The Contractor shall employ competently trained and experienced engineers and supervisors, who shall coordinate general, mechanical, and electrical Work and crafts with the required construction progress. The Contractor shall exercise complete control over their Subcontractor(s) in a manner which will unite their efforts toward completion of the project as contracted."

"3.4.5 The Contractor shall continuously maintain adequate protection of all their Work and the Work of Subcontractors from damage and shall hold harmless the Owner and Architect/Engineer from injury or loss arising in connection with this contract, including legal defense costs. The Contractor shall make good any such damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or those caused by agents or employees of the Owner."

"3.4.6 The Contractor shall be responsible for and shall establish and verify exterior lines and the required elevations of all buildings and structures to be erected at the site."

"3.4.7 The Contractor shall coordinate and expedite the Work of all lower tier Contractors."

C. Paragraph 3.5: Amend this Paragraph by adding Subparagraphs 3.5.1, 3.5.2, and 3.5.3 as follows:

"3.5.1 The Contractor shall warranty that all Work executed under the respective sections will be free from defects of materials and workmanship for the period of one (1) year from the Date of Substantial Completion of the Work or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. The Contractor further agrees that they will, at their own expense, repair and replace all such defective Work, and all other Work damaged that becomes defective during the term of the warranty. Where warranties are required, Contractor shall secure warranties in writing from Subcontractors, manufacturers and/or material suppliers addressed to and in favor of the Owner and deliver same to the Owner upon completion of Work. Delivery of warranties shall not relieve the Contractor from any obligations assumed under any other provisions of Contract."

"3.5.2 Any damage to the building or its contents and/or Work of other Contractors caused by failure of any piece of equipment and/or faulty installation shall be repaired or replaced by the party or parties furnishings the original equipment/installation and paid for by the Contractor at fault."

"3.5.3 An inspection of the installed Work and/or equipment will be made just before the end of the stipulated warranty period and any installations and/or equipment which, in the opinion of the Architect/Engineer and/or Owner, show undue wear, failure, incorrect operation, or otherwise do not conform to the letter and intent of the Contract Documents shall be repaired or replaced by the Contractor furnishing same at no additional charge."

D. Paragraph 3.6: Amend this Subparagraph by adding the words "Unless otherwise provided in the Contract Documents," to the beginning of this Paragraph.

E. Paragraph 3.9: Amend this Paragraph by adding Subparagraph 3.9.4 as follows:

"3.9.4 Subcontractors for any other Work shall have a competent superintendent at the site at all times when Work is being performed under their contracts.

F. Paragraph 3.13: Amend this Paragraph by adding Subparagraph 3.13.1 as follows:

"3.13.1 The Contractor shall prepare an overlay sketch of the construction areas indicating spaces assigned for field office, storage sheds, containers, trailers and field

shops, and for stockpiles and staging of materials for all trades. This sketch shall be submitted to the Owner and the Architect/Engineer for their information prior to moving any such equipment and materials onto the Project Site."

G. Paragraph 3.16: Amend this Paragraph 3.16 adding the following to the end:

"If Work is being executed at locations other than the Project site, the Contractor shall notify the Architect/Engineer where such Work is being executed, and at what time such Work will be ready for inspection, in order that the Architect/Engineer may inspect such Work Prior to its delivery to the Project Site."

H. Paragraph 3.18: Amend this Paragraph by adding Subparagraph 3.18.3 as follows:

"3.18.3 The Contractor shall indemnify the Owner and Architect/Engineer for any claim, demand or expense which may be made by reason of:

".1 Any injury to person or property sustained by the Owner or by any person, firms, or corporations, if caused by the Contractor."

".2 Any injury to person or property sustained by any person, firms, or corporations caused by an act or omission of the Contractor or of any person, firm, or corporation directly or indirectly employed by him in connection with this Work, whether the said injury or damage occurs upon or adjacent to the Work."

".3 The Contractor, at his own cost, expense, and risk, shall defend any and all actions, suits, or other legal proceedings that may be rendered against the Owner and Architect/Engineer in any such action, suit, or proceedings."

".4 The Contractor shall indemnify the Owner and Architect/Engineer from any and all costs resulting from any claim or suits in connection with liens that may be brought or instituted against the Owner. Neither the final payment or any part of the retained percentage of the Contract shall become due until the Contractor has delivered to the Owner a complete release of all liens arising out of the Contract."

2.04 ARTICLE 4

A. Subparagraph 4.1.2: Delete this Subparagraph in its entirety.

B. Subparagraph 4.2.7: Modify the first sentence of this Subparagraph by deleting the words "approve or take" and substituting the word "indicate."

C. Subparagraph 4.2.10: Amend this Subparagraph by adding the words "in writing" after the word "agree" in the first sentence.

2.05 ARTICLE 5

A. Paragraph 5.3: Amend this Paragraph by adding the following sentence thereto:

"Unless otherwise excepted, nothing contained in this Contract shall create any contractual relationship between any Subcontractor and the Owner."

2.06 ARTICLE 6 (NO CHANGE)

2.07 ARTICLE 7

A. Paragraph 7.1: Amend this Paragraph by adding the following new Subparagraph 7.1.4:

"7.1.4 When a change in the Work is contemplated which may affect the Contract Sum or duration of the Work, the Architect/Engineer will issue a 'Proposal Request' detailing the Work involved in such proposed change. Upon receipt of such 'Proposal Request,' the Contractor shall promptly, but in no case longer than five (5) working days, issue a reply or 'Change Quotation,' stipulating the change in cost of Project and/or duration as a result of the proposed change. This issuance of a Proposal Request does not, in any way, authorize commencement of the Work therein described. Should, after review and consultation with the Owner, the Architect/Engineer find the 'Change Quotation' by the

Contractor to be acceptable, the Architect/Engineer will within thirty (30) calendar days issue a written 'Change Order' to the Contractor."

B. Add the following Subparagraph 7.1.5 as follows

"7.1.5 If Contractor proceeds with change order work before receiving a fully executed change order or change directive, then Contractor waives the right to object to the scope of work change, the amount of the change order, and the adjustment, if any, to the time of performance."

C. Amend Subparagraph 7.3.3 by adding the following Subparagraphs:

".5 Time and material."

".6 Extra Work performed under Item .5 above shall be upon the option of the Owner only in the event that the lump sum required under Item .1 is not acceptable."

".7 Extra Work shall be performed for the cost of the labor payroll plus 15% of the labor payroll and the cost of the material plus 5% of the material cost. Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work. Labor payroll is defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.

.8 In case such Work is performed by a Subcontractor or a lower tier Contractor with the Owner's consent, the Work shall be marked up as indicated in 7.3.3.7 by the Contractor actually performing the Work. Each succeeding Contractor may mark up their direct labor and material costs as indicated in 7.3.3.7. Otherwise each succeeding Contractor, including the Prime Contractor, may add 5% for handling/coordination. Additional mark-ups of a Subcontractor's costs shall not be permitted.

".9 Costs for bond premiums are allowable provided documentation from the Bonding Company is included detailing the added bond cost premium, the current bond total and the new bond total."

D. Subparagraph 7.3.7: Amend the following:

.1 Delete the text and replace with:

".1 The cost of the labor payroll plus 15% of the labor payroll;"

.2 Delete the semicolon at the end of the sentence and add "plus 5% of the total of the costs;"

.3 Delete the semicolon at the end of the sentence and add "plus 5% of the total of the costs;"

.4 Delete all text following the word bonds in the first line and replace with ",with documentation from the Bonding Company including details of the added bond cost premium, the current bond total and the new bond total;"

.5 Delete the text and replace with:

".5 Additional costs of supervision directly attributable to the change if the change results in supervision of change work at a time outside the normal work hours of the Project."

E. Paragraph 7.3: Add the following new Subparagraphs 7.3.11, 7.3.12, and 7.3.13:

"7.3.11 When extra Work is performed under Item 7.3.3.2 above, said unit prices shall represent the total cost to the Owner and shall not be subject to any additional charges whatsoever."

"7.3.12 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete breakdown of costs, including labor, material, and subcontracts. Labor and material shall be marked up in the manner prescribed herein. Where cost items consist of major subcontracts, such contracts shall be broken down in a similar fashion."

"7.3.13 When changes are made that result in a credit to the Owner, the value of the credit will be established by the method indicated in Items 7.3.3.1 or 7.3.3.2"

2.08 ARTICLE 8 (NO CHANGE)

2.09 ARTICLE 9

A. Subparagraph 9.3.1: Amend this Subparagraph by deleting the words "if required" in the third line.

B. Paragraph 9.3: Amend this Paragraph by adding Subparagraph 9.3.4 as follows:

"9.3.4 The Owner will retain, until the Work is at least fifty percent (50%) complete, ten percent (10%) of the amount due the Contractor on account of approved progress payments. At the time the Work is at least fifty percent (50%) completed or thereafter, if the manner of completion of the Work and its progress are and remain satisfactory to the Owner and Architect/Engineer, and in the absence of other good and sufficient reasons, the Architect/Engineer will (upon presentation by the Contractor of Consent of Surety) recommend to the Owner that any remaining approved partial payments be paid in full. Regardless of the Owner's decision relative to further retainage, all prior retainages that were withheld will be held until completion of the contract Work and all remedial Work, listed as conditions of substantial completion, and following final payment. If retainage is limited to ten percent (10%) of the first fifty percent (50%) of the contract amount, as described above, five percent (5%) will be withheld from payments for all subsequent change orders; therefore, the minimum retainage shall be five percent (5%) of the current contract amount."

C. Subparagraph 9.6.3: Delete this Subparagraph in its entirety.

D. Subparagraph 9.6.5: Delete this Subparagraph in its entirety.

E. Paragraph 9.7: Delete the text of this Paragraph and replace with the following new Subparagraphs 9.7.1 and 9.7.2

"9.7.1 The Architect shall issue to the Owner a Certificate for Payment within seven calendar days after receipt of the Contractor's Application for Payment. Upon receipt of the Certificate for Payment (Application for Payment) from the Architect, the Owner will endeavor to make payment to the Contractor within fifteen calendar days. If payment is not made within a reasonable time, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents."

"9.7.2 If an Application for Payment is being held for just cause, the Architect shall notify the Contractor in writing of the cause and what remedial action must be taken for the Application for Payment to be released for payment.

F. Subparagraph 9.10.2: Amend this Subparagraph by deleting the word "and" in the eighth line and adding the following after the "Owner" in the eleventh line:

"and (6) the Architect/Engineer has received the required Record Drawings, brochures, manuals, operating instructions, warranties, affidavits, final application for payment, any other special data requirements and has performed a final inspection and confirmed that all items of completion are correct and acceptable at which time he will initiate a 'Final Completion' letter establishing the date of Final Completion."

2.10 ARTICLE 10

A. Subparagraph 10.2.2: Amend this Subparagraph by adding the following to the end thereof:

"In the event of conflict between these Contract Documents and any Federal, State, or Local Authority laws, rules, regulations, or requirements, the most stringent requirement shall govern the Work."

B. Subparagraph 10.3.1: Amend this Subparagraph by deleting the phrase "and Architect" in the sixth line.

C. Subparagraph 10.3.2: Amend this Subparagraph by deleting the phrase "and Architect" in the second sentence; deleting the phrase "and the Architect" from the third sentence; and by deleting the words "either" and "or Architect" from the fourth sentence; by replacing the phrase, "and the Architect have" with the word "has" in the fourth sentence.

D. Paragraph 10.3 add the following Subparagraph 10.3.7

10.3.7 "The Contractor shall also comply with all the safety paragraphs listed in Section 003000 of the Contract Documents. In the event of conflict between 10.3 and Section 003000, Section 003000 shall prevail."

2.11 ARTICLE 11

A. Article 11: Insert a new Subparagraph 11.1 and renumber each succeeding Paragraph accordingly:

11.1 See Specification Section 002020 for additional requirements. In the event of conflict between Section 002020 and this Paragraph 11, requirements of Section 002020 shall prevail.

B. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding the phrase, "and that are acceptable to the Owner," following the word "located," in the second line.

C. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding the phrase, ", Indiana State University, the Indiana State University Board of Trustees and the Architect/Engineer," following the word "Contractor," in the second line.

D. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding Sub-Subparagraphs .9 and .10 as follows:

".9 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

Premises Operations (including X, C, and U coverage's as applicable)

Independent Contractor's Protective

Products and Completed Operations

Personal Injury Liability with Employment Exclusion deleted

Contractual, including specified provision for the Contractor's obligations under Paragraph 3.18

Owned, non-owned and hired motor vehicles"

".10 Broad Form Property Damage including Completed Operations: If the General Liability coverage's are provided by a Commercial General Liability Policy on a claims made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage's required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2."

E. Subparagraph 11.1.2 (renumbered 11.2.2): Add the following renumbered Subparagraph 11.2.2.1

"11.2.2.1 The insurance required by renumbered Subparagraph 11.2.1 shall be written for not less than the following limits, or greater if required by law:

See Section 002020 for Insurance Requirement Levels

F. Subparagraph 11.1.3 (renumbered 11.2.3): Amend this Subparagraph by changing the word "30" to "60" in the second sentence.

G. Subparagraph 11.1.3 (renumbered 11.2.3): Amend this Subparagraph by deleting the last sentence beginning with the phrase, "Information concerning reduction…." And substituting the following:

"The form of the certificate shall be AIA Document G715, SUPPLEMENTAL ATTACHMENT for Acord Certificate of Insurance 25-S (7/90). Contractor shall furnish promptly to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Certificates of Insurance shall name the Owner (Indiana State University Board of Trustees) and Architect/Engineer as 'Additional Insured's."

H. Paragraph 11.1(renumbered 11.2): Amend this Paragraph by adding Subparagraph 11.2.5 as follows:

"11.2.5 The Contractor, in connection with the above mentioned Workmen's Compensation and Occupational Disease Insurance, shall furnish to the Owner, prior to commencement of the Work, duly executed and validated forms as prescribed by the Indiana Industrial Board showing that such insurance is in full force and effect."

I. Sub-subparagraph 11.3.1.1 (renumbered 11.4.1.1): Amend this Subparagraph by adding the following Subparagraph 11.4.1.1.1:

"11.4.1.1.1: Such Insurance shall not insure against loss due to theft of Contractor's, Subcontractor's, Sub-Subcontractor's tools, equipment, and other personal property. The responsibility to guard against such thefts shall lie with the respective Contractor, Subcontractor, or Sub-Subcontractor whose tools, equipment, and other personal property are susceptible to such thefts."

J. Subparagraph 11.3.1.3 (renumbered 11.4.1.3): Add the following phrase to the end of the sentence:

The deductible amount shall be $25,000.00 unless otherwise advised by the Owner.

K. Subparagraph 11.3.9 (renumbered 11.4.9): Delete this Subparagraph in its entirety.

2.12 ARTICLE 12

A. Subparagraph 12.2.2.1: Amend this Subparagraph by adding the following sentence to the end:

"Where special warranties of longer duration are required, the Contractor shall secure warranties from Subcontractors, manufacturers and/or material suppliers as applicable, addressed to and in favor of the Owner, and deliver copies of same to the Owner upon completion of the Work. Delivery of said warranties shall not relieve Contractor of any obligation assumed under any other provisions of the Contract."

2.13 ARTICLE 13

A. Subparagraph 13.1: Delete the text in its entirety and replace with the following:

"13.1 Contractor and all Subcontractors are responsible to comply with Indiana Code as it pertains to public works projects. The following are notable requirements set forth in IC 5-16-13, in effect as of July 1, 2015, but are not inclusive of all requirements."

B. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.1:

"13.1.1 Contractor agrees, and represents to Owner, that at least 15% of the Contract Price (at the time this Agreement is executed) is comprised of any combination of the

following: 1) Work performed by Contractor's employees; 2) Services supplied directly by Contractor's employees; or 3) Materials supplied directly by Contractor.

C. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.2:

"13.1.2 Contractor and all Subcontractors, regardless of tier, shall not pay cash to its employees for Work performed on this public works Project."

D. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.3:

"13.1.3 Contractor and all Subcontractors, regardless of tier, shall comply with federal Fair Labor Standards Act of 1938."

E. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.4:

"13.1.4 Contractor and all Subcontractors, regardless of tier, shall be in compliance with workers compensation requirements of Indiana Code 22-3-5-1 and Indiana Code 22-3-7-34 and commits worker's compensation fraud if such Contractor or Subcontractor falsely classifies an employee as an independent contractor, sole proprietor, owner, partner, officer, or member of a limited liability company."

F. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.5:

"13.1.5 Contractor and all Subcontractor, regardless of tier, shall be in compliance with unemployment compensation system requirements of Indiana Code 22-4-1 through 22-4-39-5."

G. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.6:

"13.1.6 Contractor and all Subcontractors, regardless of tier, shall be in compliance with requirements for drug testing of its employees set forth in Indiana Code 4-13-18-1 through 4-13-18-7 if estimated cost of public works Contract is at least $150,000. With each application for payment the Contractor shall submit an affidavit, dated and signed by the Contractor, that neither they nor, to their knowledge, any of their subcontractors has violated the "Drug Testing Program provision of the Indiana Code."

H. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.7:

"13.1.7 Following provisions shall be in effect for Contracts awarded after March 31, 2018."

I. Subparagraph 13.1.7: Add the following numbered Subparagraph 13.1.7.1:

"13.1.7.1 Contractor and Subcontractors, regardless of tier, shall preserve its payroll and related records for three (3) years after completion of the project work and such records shall be open to inspection by the Indiana Department of Workforce Development."

J. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.2 and 13.1.7.2.1:

"13.1.7.2 Recommended Employment of Apprentices"

"13.1.7.2.1 Owner strongly recommends that Contractor employs apprentices from each building trades craft involved in the Project to the maximum extent feasible. In doing so, the Contractor shall consider whether such apprentices are indentured into a Joint Apprenticeship Training Program or other comparable bona fide apprenticeship training program, registered and certified with the U.S. Department of Labor, Bureau of Apprenticeship and Training and shall use as a guide the Apprenticeship Standards of the Labor-Management Contract for the appropriate jurisdictional area when determining the appropriate ratio of apprentices from each respective craft."

K. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.3, 13.1.7.3.1 and 13.1.7.3.2:

"13.1.7.3 Contractor's Certification of Authorized Employment (E-Verify Requirements.)"

"13.1.7.3.1 In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

"13.1.7.3.2 The Prime Contractor shall require their subcontractors who perform work under this Contract to certify to the Prime Contractor that the subcontractor does not knowingly employ or contract with an unauthorized alien and that the subcontractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor. The Prime Contractor and its sub-contractors at all levels must comply with all provisions of the statute or the Contract is subject to cancellation.**"**

L. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.4 and 13.1.7.4.1

"13.1.7.4 Non-Collusion Affidavit"

"13.1.7.4.1 The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid."

M. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.5 and13.1.7.5.1

"13.1.7.5 Non-Discrimination"

"13.1.7.5.1 The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract."

N. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.6 and13.1.7.6.1

"13.1.7.6 Certification of United States Steel"

"13.1.7.6.1 The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

O. Subparagraph 13.5.1: Add the following Subparagraph 13.5.1.1:

"13.5.1.1: Prior to commencing the Project the Contractor shall submit a list of all proposed testing companies for the Project to the Architect/Engineer and Owner for approval."

P. Subparagraph 13.5.2: Add the following Subparagraph 13.5.2.1

"13.5.2.1: Prior to testing, unless the testing company has been previously approved, the Contractor shall submit to the Architect/Engineer and Owner the proposed testing company for approval."

2.14 ARTICLE 14

A. Subparagraph 14.1.1: Amend this Subparagraph by deleting Sub-Subparagraph .4.

B. Subparagraph 14.2.1: Amend this Subparagraph by adding a new Sub-Subparagraph 14.2.1.5 as follows:

"5 becomes financially incapable of completing the Work contemplated by the Contract Documents."

C. Add subparagraph 14.2.5 as follows

"14.2.5 Contractor shall be responsible to reimburse Owner all attorney's fees and expenses incurred by Owner if Contractor is terminated for cause."

2.15 ARTICLE 15

A. Subparagraph 15.1.2: Delete the text of this Subparagraph and replace by adding the following Subparagraph 15.1.2.1, Subparagraph 15.1.2.2 and Subparagraph 15.1.2.3:

"Subparagraph 15.1.2.1 Claims must be initiated by written notice to the Architect within 21 calendar days after the occurrence of the event."

"Subparagraph 15.1.2.2 Notice of a claim must include what the claim is for, when the event occurred causing the claim, the amount of additional time (Project extension) being requested and any financial implications of the claim with sufficient specificity to allow the Owner an opportunity to modify the Project scope to remain within the Owner's approved budget."

"Subparagraph 15.1.2.3 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction."

B. Subparagraph 15.1.4 delete this Subparagraph in its entirety.

C. Subparagraph 15.1.5 delete this and all its subparagraphs in their entirety.

D. Subparagraph 15.3.2 Delete the text in its entirety and replace with the following:

"15.3.2. If, through acts of neglect on the part of the Contractor, any other Contractor or Subcontractor shall suffer loss or damage on the Work, the Contractor shall agree to settle with such other Contractor or Subcontractor by negotiation or binding dispute resolution, if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim, including legal defense costs."

E. Subparagraph 15.3.3 In the first sentence after the word "fee" add a period and delete the remainder of that sentence.

F. Paragraph 15.4: Delete this Paragraph in its entirety. Additionally; delete all references and requirements for Arbitration throughout the entire AIA A201-2007 Document and replace with Litigation.

PART 3 – NOT USED

END OF SECTION 002011

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Preface: ***These Supplementary General Conditions supplement and modify AIA Document A201 General Conditions of the Contract for Construction (2007 Edition), General Conditions between the Owner and Contractor.***

PART 1 - SUPPLEMENTARY GENERAL CONDITIONS

1.01 DEFINITIONS

A. "Contract". The Contract or Agreement, the Notice to Bidders, the Instructions to Bidders, the Bid or Proposal, the General Conditions, The Special Conditions, the Specification and Drawings, also any Addenda or the Modifications incorporated in any of the above documents before the execution of the Contract or Agreement.

B. "Owner": The Indiana State University Board of Trustees.

C. “Architect/Engineer”: the individual or firm hired by the Owner to prepare the Construction Documents and to Administer the Contract.

D. "Contractor": The person, firm or corporation who, with the Owner, executes the Contract, or the duly recognized assignee thereof.

E. "Subcontractor": A person, firm or corporation who, under contract with Contractor, furnished material only, labor and materials, or labor only, at the site of or for the project.

F. “Director": The Director of Department of Facilities Management at Indiana State University, or his duly authorized representative.

G. "Surety": Any person, firm or corporation which has executed, as surety, the Contractor's performance bond securing the performance of the within contracts.

H. "Work": Includes both materials and labor.

1.02 BOND

A. Before any contract made for this work becomes valid, the Contractor shall furnish the Owner a satisfactory performance and payment bonds, in such form as the Owner may prescribe and with such surety or sureties as it may approve each in an amount equal to 100% of the total contract price. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. These bonds shall guarantee all labor and material to be as required, the faithful payment of any claim or liens from any cause for which the Contractor or any Subcontractor is liable, including those for labor, materials, utility service, transportation costs and for supplies, equipment, machinery (or the rental thereof).

B. Licensed Sureties and Insurers

1. All bonds required by the Contract Documents (such as the Bid Specifications, Award Letter, Contract for Construction, etc.) to be purchased and maintained by the Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. In addition to appearing on Circular 570 U.S. Dept. of the Treasury, such Surety or insurance company shall maintain an A.M. Best's Rating of not less than "A".

C. The surety bond shall contain the following paragraph:

1. "The said surety for value received hereby stipulates and agrees that no change, extension of time, alterations, or additions to the terms of the contract, or to the work to be performed hereunder, or the specifications accompanying them, shall in any way affect its obligations on this bond, alteration or addition to the terms of the contract, or to the work or the specifications."

1.03 INSURANCE

NOTE: The dollar amounts shown in this paragraph are for jobs over $50,000. See footnotes and amounts for jobs less than $50,000.

A. The Prime Contractor(s) shall provide all insurances listed here-in in these Specifications and shall require the Subcontractor(s) to provide the same. The Prime Contractor(s) shall not commence work under this Contract until they have obtained all insurance required by these specifications and until such insurance has been approved by the Owner, nor shall the Contractor allow any Subcontractor to commence work on his subcontract until all similar insurance required of the Subcontractor has been obtained. Policies expiring on a fixed date before final acceptance of the project must be renewed and evidence of such renewal submitted to the Owner before such date.

B. The Prime Contractor(s) shall furnish the Owner with satisfactory evidence of the insurance required, with satisfactory compliance as determined solely by Owner.

C. It is solely the responsibility of the Prime Contractor(s) to confirm that the Subcontractor(s) are in compliance with the insurance requirements of these Specifications, to maintain copies of the Subcontractors insurance on file and to be prepared to provide evidence of these insurances to the Owner upon demand.

D. Insurance Required:

1. Worker's Compensation and Employers Insurance:
   a. The Prime Contractor(s) shall maintain during the life of this contract Worker's Compensation and Employers Liability Insurance for all Prime Contractor's employees employed at or involved in any manner with the project, and, in case any work is sublet, the Prime Contractor(s) shall require the Subcontractor(s), at their own expense, similarly to provide Worker's Compensation and Employers Liability Insurance for all of the Subcontractor's employees engaged in or involved in any manner with work under this contract. Such Workers' Compensation insurance will be in accordance with the statutory requirements of the State of Indiana, with and including Worker's Compensation for All Other States, if any. The Prime Contractor(s) shall and require Subcontractor(s) to provide insurance coverage equal to that provided under the Worker's Compensation Act, for the protection of the Contractor's employees not otherwise protected. Employer's liability coverage must be maintained in amounts not less than $500,000/$500,000/$500,000. Limits may be provided through a single policy or a primary/excess policy basis.

2. Commercial General Liability Insurance.[1]
   a. The Contractor shall and require Subcontractors, at their own expense respectively, to maintain during the life of this contract Commercial General Liability Insurance insuring the Prime Contractor and any subcontractor, and owner and any other party required to be insured, from claims for bodily injury, death, personal injury and property damage which may arise from or on account of operations under this Contract, whether such operations be by the Prime Contractor(s) or by any

[1] For Smaller Contracts, the following limits (including umbrella liability) are permitted:
Contracts $25,000 to $49,999..... $ 2,000,000
" $10,000 to $24,999..... $ 1,000,000
" $ 9,999 and under..... $ 500,000

Subcontractor or by anyone directly or indirectly employed by either of them and the amounts of such insurance shall be as follows:

- $2,000,000 General Aggregate
- $1,000,000 Combined Single Limit Bodily Injury, Property Damage
- $1,000,000 Products/Completed Operations
- $1,000,000 Personal Injury and Advertising Injury
- $ 100,000 Fire Damage

The General Aggregate limit shall apply separately, in total, to this project only.

3. Business Auto Insurance[2]:
   a. The Prime Contractor(s) shall and shall require all Subcontractors to maintain at their own expense respectively, at all times during the life of this contract, business auto insurance covering all liability and claims arising from the ownership, use, maintenance, operation, loading or unloading of automobiles anywhere in the United States, in connection with the performance of the Contract, whether such automobiles are owned, hired, or non-owned by the Contractor or Subcontractors.
   b. Such auto insurance shall be written with a limit of not less than $1,000,000 per occurrence as a combined single limit for Bodily Injury and Property Damage coverage.
4. Umbrella Liability Insurance[2]:
   a. The Prime Contractor(s) shall and shall require all Subcontractors to maintain at their own expense respectively, at all times during the life of this Contract, Umbrella Liability Insurance providing excess coverage over the above specified primary insurance in an amount not less than:
      - $1,000,000 for contracts $50,000 to $99,999.99
      - $2,000,000 for contracts $100,000 to $999,999.99
      - $3,000,000 for contracts $ 1,000,000 to $2,999,999.99
      - $5,000,000 for contracts over $3,000,000

E. Additional Insurance Requirements:

1. The Prime Contractor(s) shall and shall require all Subcontractors to include Indiana State University, Indiana State University Board of Trustees and any Architect/Engineer Firm hired by Indiana State University for the Project, as an additional insured on their Commercial General Liability, Umbrella Liability Insurance and Business Auto Insurance policies with regard to this contract.
2. Certificate(s) of Insurance shall include an endorsement of a Waiver of Subrogation in favor of the Owner for Commercial General Liability Insurance, Umbrella Liability Insurance, Worker's Compensation and Employers Liability Insurance and Business Auto Insurance.
3. On Projects in excess of $1,000,000.00 a copy of the applicable pages from the Contractor's policy shall be provided showing the endorsements listed in paragraphs 1 and 2 of this Item 1.03 E.
4. With regard to the above mentioned Commercial General Liability, Business Auto, and Umbrella Liability Insurance, if in the event of any major change or cancellation of such policy, the Prime Contractor(s) shall and shall require all Subcontractors to give a 30-day advance notice to the Owner.
5. The Prime Contractor(s) shall and shall require of all Subcontractors that the insurance companies must have an A.M. Best's rating of not less than an "A" for projects over $150,000 and a rating of B+ or higher for projects under $150,000 and that the insurance

[2] For Smaller Contracts, the following limits (including umbrella liability) are permitted

Contracts $25,000 to $49,999.....$2,000,000
$10,000 to $24,999.....$1,000,000
$ 9,999 and under.....$ 500,000

companies are duly licensed or authorized in the jurisdiction in which the Project is located to issue insurance policies for the limits and coverages so required.

F. Builders Risk Insurance:

1. The Owner agrees to provide property insurance including Builders Risk insurance for property under construction, and all materials and labor at or within 1,000 feet of the site intended for use in the "work" or project. Pursuant to this agreement, Owner hereby affirms the policy contains a waiver of subrogation in favor of the contractor or subcontractors should loss or damage of the type insured against result in loss to covered property; and Owner agrees to release from liability the contractor, to the extent such loss or damage is insured by said policy.
2. Coverage does not extend to personal property, tools, equipment, scaffolding, staging, or similar equipment of the contract or subcontractor(s), or any employees thereof.
3. Notwithstanding the foregoing however, Contractor is responsible for the property insurance deductible of $25,000 applicable to each covered loss to the work or project. Contractor acknowledges and affirms it will, without delay, pay the deductible, or if the loss remains within the deductible, pay that part of the deductible that equals the loss amount.

G. Indemnification:

1. The Prime Contractor shall and shall require Subcontractors to indemnify the Owner and any other party required to be insured from all claims arising from the failure of the Prime Contractor(s) to require the Subcontractors to provide the insurance required by these Specifications.
2. Notwithstanding any other provision to the contrary, the Contractor(s) agree to indemnify the Owner only for losses due to personal injury, or property damage to the extent caused by Contractor's negligent acts or omissions, or the negligent acts or omissions of Contractor's employees, agents and subcontractors during the performance of this Contract, but not to the extent caused by others. The Contractor shall defend Owner on claims that do not present a conflict of legal theory or fact between Owner and Contractor. Each party shall defend itself on any claim that does present a conflict of legal theory or fact between the parties.
3. Under no circumstances shall either party be liable for any loss, damage or delay due to any cause beyond either party's reasonable control, including but not limited to acts of government, fire, explosion, theft, weather damage, flood, earthquake, riot, civil commotion, war, mischief or act of God.
4. In the event of a strike or work stoppage by Contractor's employees, the Contractor agrees to use its best efforts to fulfill its obligations pursuant to their contract utilizing management and supervisory personnel.
5. Under no circumstances shall either party be liable to the other for special, indirect, or consequential damages of any kind including, but not limited to, loss of profits, loss of good will, loss of business opportunity, additional financing costs or loss of use of any equipment or property, whether in contract, tort (including negligence), warranty or otherwise, notwithstanding any indemnity or other provision to the contrary.

1.04 SUBCONTRACTORS

A. At the time of Bid the Prime Contractor(s) (Bidder(s)) shall provide the names of the proposed Subcontractors listed in Appendix A of the Bid Form. Prior to the Awarding of the Contract, the Contractor shall submit to the Owner, in writing, the names of all the proposed Subcontractors and major material vendors. All Subcontractors shall be licensed and bonded and shall be held to the same level of experience and qualifications as are required of the Prime Contractor (Bidder) in Section 001000 NOTICE TO BIDDERS last paragraph.

B. The Prime Contractor shall be responsible for the acts and omissions of his Subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

C. Nothing contained in the Contract shall create any contractual relationship between any Subcontractor and the Owner, and no Subcontractor will be recognized as a party to the Contract.

D. The Prime Contractor shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix “A” submitted at the time of Bid. There shall be no changes permitted to this list except as listed in Section 001010 Paragraph 3.14 APPENDIX A, Item B.1.

1.05 DRAWINGS

A. The drawings referred to in these specifications show such plans and details as are regarded necessary by the Architect/Engineer and/or the Owner to properly illustrate the work required, to estimate the cost of the work, and to complete its construction.

B. The Architect/Engineer and/or the Owner will from time to time furnish such additional detail and working drawings as may be deemed necessary to interpret and explain the Contract drawings and all such additional drawings shall be of equal force with those mentioned above and shall be considered as forming part of this Contract.

C. The general character of the work shall be subject to minor modifications when detailed or full sized drawings for such work are prepared.

D. All lettering on drawings is to be considered a part of the drawings.

E. All drawings, specifications, etc., are the property of the Owner and shall be returned before the final award is issued, if so requested.

1.06 RELATIONSHIP AND PRIORITY OF DOCUMENTS

A. The documents comprising the Contract are complementary and what is called for by one shall be as binding as if called for by all. The intention of the Contract is to include all labor, materials, and equipment necessary for the proper execution of the work.

B. In the case of a discrepancy between the requirements of the Drawings and the Specifications or between Sections of the Specifications:

1. The more stringent shall apply.
2. In equal situations the Specifications or as directed by the Owner prevails.

1.07 PERMITS

A. The Contractor shall give all requisite notices to public officials, secure and pay for all permits, legal fees or charges, have the work inspected by all proper public authorities, pay all charges connected with such inspections and deliver the proper inspection certificates and all receipts for charges to the Owner.

B. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the work. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Owner in writing, and any necessary change shall be accomplished by the appropriate modification. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations and without such notice to the Architect, he shall assume full responsibility therefore and shall bear all cost attributable thereto.

1.08 SAMPLES

A. The Contractor shall submit in writing to the Owner for approval samples and shop or installation drawings of the materials he proposes to use, or such other related materials as owner otherwise requests.

B. Each sample shall be labeled, bearing the name and quality of the material, the Contractor's name, the date and a description of the sample. A letter from the Contractor stating that the samples conform to the requirements of the drawings and specifications shall accompany all such samples. Transportation charges on all samples shall be prepaid.

C. Samples and drawings shall be submitted in due time so as to permit proper consideration without delaying the Contractor's operation. Material shall not be ordered until approval is received from the Owner, in writing. The use of any material will be permitted only so long as it remains equal to the approved sample.

1.09 CONTRACTOR'S SUPERVISION

A. The Prime Contractor shall maintain on the Project site a competent Project Superintendent at all times any work is being performed; either by the Prime Contractor's workers or any Subcontractor's workers**. If the Project Superintendent is not on the Project site the Owner shall be notified immediately. If the Project Superintendent is not on the jobsite, without written prior approval or notification to be away from the jobsite, the Owner may be entitled to a $1,000 credit for each day or part of the day the Project Superintendent is not onsite while actual work is being performed.**

B. The Contractor's superintendent shall represent the Contractor during their absence and all directions given the superintendent shall be as binding as if given to the Contractor.

1.11 LAYING OUT AND UTILITY LOCATES

A. The Contractor shall thoroughly examine the drawings and specifications before commencing work and report to the Owner if any discrepancy, errors, or defect appears, but he shall not be held responsible for their existence.

B. The Contractor shall lay out his own work.

C. Prior to any cutting, drilling, trenching, excavating or other earthwork the Contractor shall determine the exact location of all utility lines and appurtenances that could be encountered which are not shown on the drawings as follows.

1. A minimum of forty eight (48) hours prior to commencing work the Contractor shall contact Indiana Locates for all public utility locates.
2. A minimum of forty eight (48) hours prior to commencing work the Contractor shall contact the Project Coordinator for all ISU Utility locates.

D. Failure to contact for the appropriate locates shall make Contractor solely responsible for all costs incurred to repair all damaged utility lines or appurtenances.

E. The Contractor shall hand excavate within three (3) feet, or as required by the Utility Company, on either side of a marked utility unless exact depth of the marked utility is known and the planned work will in no way be in close proximity with the utility line or appurtenance.

1.12 MATERIAL AND LABOR

A. Except as otherwise stipulated, the Contractor shall provide and pay for all materials, labor, tools and equipment necessary for the execution of the work.

B. The Owner reserves the right to require the Contractor to discontinue the service of any workmen employed on the work whom he deems incompetent, negligent, or otherwise objectionable, and to suspend any portion of the work embraced in the Contract whenever, in his opinion, it would be inexpedient to start or continue such work.

1.13 DEFECTIVE WORK AND MATERIALS

A. Any materials and workmanship found to be defective, improperly placed, not in strict conformity with the drawings and specifications, or defaced or injured through action of fire or elements, through usage by the Contractor or his employees or from any other cause, shall be removed immediately from the premises and satisfactory materials or work substituted therefore without delay. This shall include making good the work of other Contractors destroyed or damaged by such removal or replacement. The cost of the above replacements shall be borne by the Contractor responsible for the defective work or material.

B. Should the Contractor in the execution of his work discover any imperfections or errors in the work of other Contractors that would interfere with the proper execution of his contract, he

shall immediately report this fact to the Owner. Errors or imperfections in the work of other Contractors will in no case excuse installation of imperfect work by this Contractor.

C. No previous inspection shall be held as an acceptance of defective work or materials or relieve the Contractor from the obligation to furnish sound materials or to perform satisfactory work in accordance with the contract requirements. The final payment shall not relieve the Contractor of the responsibility for faulty materials or workmanship and he shall remedy all such defects, settlements, or other work resulting there from, which shall appear within a period of one (1) year from date of final acceptance or within the period stipulated in certain separate guarantees or bonds required elsewhere in the specifications, whichever may be the longer.

D. The Owner shall be the sole judge of the materials furnished and the character of work performed.

1.14 RESPONSIBILITY FOR DAMAGE

A. The Contractor shall be responsible for all damages to life and property due to his action or failure to act when action would reasonably be expected. He shall be responsible for all parts of his work, both temporary and permanent, until the work under his contract is declared accepted by the Owner.

B. The Contractor shall continuously maintain adequate protection of all his work from damage, and shall protect the Owner's property and all adjacent property from injury in connection with the Contract.

C. The Contractor shall be held responsible for damage to work of other Contractors that is the result of his operation.

D. Should the Contractor believe that the work shown by the drawings or specifications is not correct when executed to obtain safe and substantial results, or if any discrepancy appears, it is his duty to immediately notify the Owner in writing, stop work on same, and await written instruction.

1.15 INDIANA SALES TAX

A. Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid or on any Application for Payment.

B. Contractor Responsibilities:

1. Pay Indiana Sales Tax on all non-exempt purchases and provide the Owner with detailed documentation of all taxes of non-exempt items invoiced on their Application for Payment. Documentation shall be provided with their Application for Payment at the time of first billing of each taxable item.
2. Upon completion of work, file with Owner notarized statement that all purchases were made under their exemption certificate where entitled to be exempt.
3. Pay legally assessed penalties for improper use of the exemption certificate number.

1.16 CLEANING UP

A. The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish.

B. When directed by the Owner, the Contractor shall clear out and remove any rubbish that may constitute an obstruction to the progress of the work.

C. At completion of the contract, the Contractor shall remove from the premises all rubbish and surplus material, and shall repair any damage to his work no matter by who caused, and shall leave the premises clean and in perfect repair and order.

1.17 NON-DISCRIMINATION CLAUSE

A. "Pursuant to the requirements of Indiana Code 22-9-1-10 and 5-16-6-1, Contractor and his Subcontractors may not discriminate against any employee or applicant for employment to be employed in the performance of such contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans With Disabilities Act. The contractor and subcontractor, if any, agrees to comply with all the provisions contained in the Equal Opportunity Clause quoted in Executive Orders No. 11246 and No. 11375. In addition, the contractor shall cause this Equal Opportunity Clause to be included in the subcontracts or purchase orders hereunder unless exempted by rules, regulations and orders of the Secretary of Labor issued pursuant to Section 204 of the Executive Orders No. 11246 and No. 11375 as amended. Breach of the covenant may be regarded as a material breach of contract."

1.18 PUBLIC RELATIONS

A. Indiana State University is an Affirmative Action Institution. Any inappropriate actions toward any Indiana State University student, faculty or staff member by any Contractor's Employee shall result in the employee being told to leave the Campus of Indiana State University immediately. This employee shall not be allowed to return to work on the Project for the duration of the Project or longer. Repeated offences by a Contractor's employees may result in disqualification of the Contractor for this and future Indiana State University Projects.

1.19 "OR APPROVED EQUAL" CLAUSE

A. Unless the Specifications indicates that substitutions are not allowed, whenever a material or article required is specified or shown on the plans by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory providing the material or article so proposed is of equal substance and function in the Architect/Engineer and Owner's opinion. It shall not be purchased or installed without written approval. Requests for substitution prior to Bidding shall be as per Section 001010 INSTRUCTIONS TO BIDDERS Item 1.08

B. Complete descriptive information, specifications and samples or sample material must be submitted at the time the proposal is submitted. In addition, a list of projects with dates and contact persons must be submitted at the time the proposal is submitted showing where the proposed alternate material or article has been installed or used. Failure to submit information as requested will be cause for rejection of the Bid submitted.

1.20 VERIFYING MEASUREMENTS

A. The Contractor shall verify all measurements on the site and be responsible for any mistakes he may make and their results. If the Contractor discovers any discrepancy, in figures on the drawings, he shall report same to the Architect/Engineer and Owner before proceeding with any work affected by the discrepancy and shall be held responsible for results should he fail to make such reports.

1.21 EXTRAS

A. Without invalidating the Contract, the Owner may order extra work or make changes by altering, adding to, or deducting from the work, the Contract sum being adjusted accordingly, and the consent of the Surety being first obtained where necessary or desirable. All work of the kind Bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Owner, and the price is stated in such order.

B. Requests for compensation, for previously approved Change Orders omitted from an Application for Payment, received sixty (60) calendar days after Owner receipt of the Final Application for Payment (Release of Retainage) shall not be honored.

1.22 GENERAL GUARANTY

A. Neither the final certificate of payment nor any provision in the Contract documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified.

PART 2 – NOT USED

PART 3– NOT USED

END OF SECTION 002020

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PART 1- SPECIAL REQUIREMENTS

1.01 BARRICADES

A. ISU will provide barricades during the initial closure of a construction site. However, once the Contractor mobilizes, ISU will remove the barricades, and Contractor shall replace them with his own. If additional barricades are required during the construction phase, Contractors shall provide them at their expense.

1.02 BURIED UTILITIES

A. All Direct Buried Utility Lines and Utility Duct Banks will be marked by use of the appropriate marker tape continuously installed a minimum of twelve (12) inches above said utility line or duct bank. Marker tape shall be a minimum of six (6) inches wide.

1.03 REMOVAL AND RE-INSTALLATION OF EQUIPMENT

A. The Owner is not responsible for the removal or re-installation of any equipment necessitated by this work.

B. All electrical disconnects and reconnects of equipment necessitated by this work shall be performed by a licensed bonded Electrical Contractor hired by the Contractor to perform this work. The Owner will assist in locating the power source but will not be responsible for the actual performance the electrical work.

1.04 PRIME CONTRACTOR RIGHT OF SALVAGE

A. The Owner has the first right of salvage of any items not slated for re-use on every Project.

B. Should the Owner waive their right for salvage for any item not slated for re-use or designated in Section 011510 for recycling; then these items become the property of the Prime Contractor.

C. The Prime Contractor at their discretion may grant to others the right to salvage items not slated for re-use and this may be used to comply with the recycling requirements of Section 011510 as long as records are kept as defined in 011510.

D. However; once an item has been placed in a dumpster or any other trash receptacle no one is allowed to enter a dumpster or search through a trash receptacle for the purpose of removing items for salvage while these trash containers are on the campus of Indiana State University.

E. The Prime Contractor shall protect these trash containers by use of a six (6) foot high chain link fence enclosure around the trash container(s) to prevent any person from gaining access to the trash containers for actions prohibited by this item.

1.05 CERTIFICATE OF INDUSTRIAL BOARD

A. The Contractor shall furnish a certificate of insurance from an insurance company acceptable to Indiana State University evidencing that the Contractor has complied with the Indiana Worker’s Compensation Law.

1.06 CAMPUS TOBACCO POLICY

A. Effective in 2011 the following became the ISU smoking policy:

1. The sale of tobacco products is prohibited on university-owned, operated, or leased property.
2. The use of smoking tobacco products is prohibited on university-owned, operated, or leased property.
3. The use of smoking tobacco products is permitted in privately owned vehicles and in designated smoking areas on campus.
4. Any exceptions for the use of smoking tobacco products on university-owned, operated, or leased property must be approved by the President or Provost.

5. Enforcement of this policy will depend on the cooperation of all faculty, staff, and students not only to comply with the policy, but also to encourage others to comply, in order to promote a healthy environment in which to work, study and live.
6. Observation of violation of the policy should be reported to Public Safety at 812-237-5555. Follow up for violations of the policy should be referred to the appropriate administrative office for review and action for faculty through the office of Academic Affairs, for staff through Human Resources and to the Dean of Students for students.

B. Amendments to this policy for Contractors
1. Delete item 5 in its entirety and replace with the following:

"Enforcement of this policy will depend on the cooperation of the Contractors and their employees to comply with the policy and encourage others to comply in order to promote a healthy environment in which to work".

2. Delete item 6 in its entirety and replace with the following:

"Observation of violation of this policy should be reported to the Contractor's Project Superintendent and/or the Owner's Project Manager. Contractor's employees repeatedly violating this policy may be asked to leave the Campus of Indiana State University and not be allowed to continue work on the Project".

3. Add the following item 7:

"For major construction or renovation Projects (as determined solely by the Owner) the Owner shall designate a Contractor's smoking area near or within the boundaries of the job-site; unless the Prime Contractor(s) chooses to declare the entire Project job-site as non-smoking. Under no circumstances shall smoking be permitted within a building under construction or renovation.

C. Additionally on construction sites on university-owned, operated, or leased property the use of smokeless tobacco products is prohibited.

1.07 PARKING REGULATIONS

A. Beginning January 2018, construction employees will be required to park with a Construction Permit in Lot N (11th and Chestnut), Lot K (1st and Chestnut) or Lot I (3rd and Tippecanoe) when regular classes are in session. Contractors will be allowed to request an appropriate number of permits depending upon the project size for "core campus" parking. These permits should be used for carpooling or transporting employees to/from the construction and the construction parking lots. Contractors will also be allowed to have 2 foreman construction permits per project which will allow the foreman direct access to the construction project.

B. When regular classes are not in session (i.e. weekends, Fall Break, Winter Recess, and summer sessions [the Monday after commencement thru one week before move-in]) contractors and their employees will be allowed to park in any regular/open lot on campus with a construction permit unless the lot is reserved for an event.

1.08 ISU ENVIRONMENTAL CODE FOR CONTRACTORS

A. Prior to starting any work, Contractor shall provide to the Owner a written document containing emergency procedures in case of:
1. Liquid spills or leaks
2. Release of gases or toxic vapors
3. Excessive smoke

B. This document shall contain but not be limited to:
1. Emergency medical, fire, and police phone numbers including the ISU University Police.
2. EPA phone numbers
3. IDEM phone numbers
4. Location of Material Safety Data Sheets.

C. Prior to using any chemical or hazardous material the contractor shall provide the Owner with a copy of Material Data Safety Sheets covering the chemical or hazardous material.

D. Contractor shall not burn or bury waste material on campus, or discharge any hazardous, or undesirable materials to sewers, or release toxic materials to the air.

E. Contractor shall provide adequate exhaust ventilation for work area when generation of air contaminants is likely, i.e., painting, handling flammable liquids, welding, cutting, applying adhesives, etc.

F. Contractor shall have at the job site Material Safety Data Sheets (MSDS) covering all chemicals and hazardous materials to be used in the work area. MSDS are to be available to workers and ISU personnel during normal working hours. Contractor shall use proper procedures based on MSDS when handling hazardous chemicals and materials.

G. Contractor shall provide vacuum breakers or backflow preventers at each location where he utilizes building water supply.

H. Any Contractor employee who deliberately interferes with environmental monitoring shall be removed from the project immediately.

I. Contractor shall prevent fumes from welding, cutting, etc. and dust generated by construction from entering areas outside the work area by erecting plastic film barriers, sealing openings and ducts, and installing exhaust fans as required.

J. Air contaminants in the work area shall not exceed OSHA regulations.

1.09 ISU SAFETY CODE FOR CONTRACTORS

A. General:

1. All work performed by contractors shall be done in accordance with all applicable Federal, State and Local laws, codes, and regulations and recommendations of Factory Mutual Engineering and Research (FM).

2. Any safety hazard or unsafe act recognized by the Owner shall be reported to the Contractor responsible for job coordination. The safety hazard shall be corrected in a timely manner dictated by the severity of the safety hazard or unsafe act.

3. Contractors shall remove all rubbish from the job site daily.

4. All construction materials shall be protected from wind damage. Materials shall be secured to prevent them from becoming airborne with subsequent injury to personnel or damage to property.

B. Communication:

1. Contractor's job supervisors, or designated safety persons, must carry at all times a cellular phone to facilitate communication between the job site and the ISU University Police and Facilities Management Department. The cellular phones must remain on the job site during regular working hours. Contractor(s) shall report to the designated representative of ISU, or to ISU Police, any safety problem, code infraction, personal injury, or damage to ISU property. Report shall be made immediately after such occurrence.

C. Fire Protection:

1. Contractors shall provide a type "ABC" fire extinguisher for each work crew.

2. Extinguishers are to be kept within easy reach of each work crew and never farther than 10 feet from some worker. Inspection tags on extinguishers shall indicate the date of last inspection.

3. Contractor's supervisor shall keep torch cutting operations to a minimum by instructing personnel to use power saws, pipe cutters, etc. It shall be the duty and responsibility of

the Contractor performing any cutting or welding to comply with the safety provisions of the National Fire Codes (NFC) pertaining to such work.

4. Contractor shall adhere to Factory Mutual Engineering and Research (FM) "Cutting and Welding" permit system. Permits are available through the Office of Environmental Safety's Fire Specialist Office at 812-237-4020.
5. Prime Contractor shall provide a one hour fire watch at the end of each workday when any cutting or welding occurred to assure that no possibility of fire exists from any work performed that day.

D. Safety Program: Prior to starting any work the Contractor shall submit to ISU a written safety program for the project including but not limited to:
   1. Occupational Health & Environmental Controls
      a. Personal Protective Equipment
      b. Fire Protection & Prevention
      c. Hand & Power Tools
      d. Ladders & Scaffolds
      e. Motor Vehicles and Mechanized Equipment
      f. Accident Prevention
      g. Safety Inspections
      h. OSHA Inspections
   2. Instruct all of his personnel as to location of emergency telephone(s).
   3. Instruct all his personnel as to location of fire alarm (pull) stations.
   4. Instruct all of his personnel to follow FM "Cutting and Welding Permit Systems" and emphasize the need to advise ISU's representative 24 hours prior to doing any welding, cutting, brazing, etc.
   5. Instruct all his personnel to advise ISU representative prior to doing any welding, cutting, or brazing on or near a roof structure.
   6. Instruct all personnel as to location on the job site of a copy of OSHA 29 CFR, Part 1926.
   7. Instruct all of his personnel as to location of first aid supplies.

E. Flammable Storage:
   1. Flammable or combustible liquids (paints, thinners, asphalt, gasoline, and tar or similar materials) shall be stored and handled as per NFPA 30, 4-5.5, and OSHA Construction Standard 1926.152. Quantities of flammable paints, etc., inside building work areas shall not exceed the amount to be used in one day.
   2. Containers of Class I liquids that are stored outside of an inside liquid storage area shall not exceed a capacity of 1 gallon, except safety cans shall be permitted up to 2 gallon capacity. Not more than 10 gallons of class I and class II liquids combined shall be stored in a single fire area outside of an approved storage cabinet or an inside liquid storage area unless in safety cans. Not more than 25 gallons of class I and class II liquids combined shall be stored in a single fire area in safety cans outside of an inside fluid storage area or an approved storage cabinet. Not more than 60 gallons of class IIIA liquids shall be stored outside of an inside liquid storage area or outside an approved storage cabinet.
   3. Rags saturated with flammable liquids shall be placed in approved cans and removed from the work site at the end of the work shift.

F. Site Control: Contractor shall be responsible for securing the job site at all times and have personnel on call 24 hours per day for emergencies. Contractors shall protect their equipment and materials and ISU property from theft. Contractors shall secure doors, and openings including roof openings.

G. Prior to a multiple day shutdown the Contractors shall:
   1. Remove all debris and leave the premises broom clean.
   2. Shut off all unnecessary electric power and water supplies.
   3. Remove all flammable liquids from the work site.
   4. Secure small tools in gang boxes.
   5. Leave drives open for emergencies.

H. Temporary Electrical Service:
   1. Temporary electrical service shall be provided by a licensed, bonded electrical contractor.
   2. All extension cords shall be protected from abrasion and traffic. Multiple lengths of extension cord shall be connected with waterproof twistlock type connectors. Any electrical service over 115 volts shall be marked accordingly. All electrical power supplied from building service or portable generators shall have ground fault protection as part of the circuit.
   3. Portable generators or welders driven by internal combustion engines shall not be located inside the building. Positioning of this equipment outside the building shall be such that engine exhaust shall not enter the workplace or adjacent buildings.

I. OSHA Reporting:
   1. Contractors shall complete an OSHA 106 form on all reportable occupational injuries and illnesses for each of their job locations on the ISU campus. This requires posting the information from the initial accident report on a master log (OSHA 200) form within six working days after the accident occurs. This form must be kept available for OSHA Compliance Safety and Health Office and ISU review.
   2. See OSHA Regulations 29 CFR Part 1904, "Recording and Reporting Occupational Injuries and Illnesses"

1.10 FIRE SUPPRESSION SYSTEM REGULATIONS

A. Prior to closing any fire suppression system valve or in any way making a fire suppression system inoperable the Contractor shall contact the Fire Specialist's Office at 812-237-4020 to obtain a FM Global Red Tag so the impairment to the system may be reported.

B. When the work is complete the Contractor shall immediately contact the Fire Safety Specialist to report the work is complete so the red tag may be removed and FM Global notified that the system has been returned to normal operation.

1.11 ELECTRICAL SAFETY REGULATIONS

A. OSHA *Control of Hazardous Energy Lockout/Tagout Regulations* apply to all work performed on the Campus of Indiana State University. These Regulations are available for review on the OSHA Internet Website at **http://www.osha.gov/SLTC/controlhazardousenergy/index.html** . Any individual who removes another's lock or tag shall be ordered to leave Indiana State University and shall be disqualified from any future work at Indiana State University.

B. High fault currents, in excess of 45kA, exist at certain points on electrical systems at Indiana State University. Employing Contractors shall make their employees working on campus electrical systems aware that this condition exists.

C. No individual shall be permitted to install or service any energized circuit, equipment or apparatus where voltages greater than 100 volts to ground is present unless another individual is present.

D. No individual shall be permitted to operate or service any main or feeder main overcurrent protection device, whether group mounted or individually mounted, unless another individual is present.

E. Deliberately shorting a branch circuit to ground to locate a branch feeder breaker is strictly prohibited.

F. Any individual observed in violation of Regulations “C”, “D” or “E” may be asked to immediately leave the workplace and/or their employer may be fined based on the following scale. Violations may apply to one or multiple employees.

- 1st violation — Notice of Violation Warning Placed in Employing Firm’s Work Record File
- 2nd violation — $100.00
- 3rd violation — $250.00
- All subsequent violations — $500.00 per incident

G. **Repeated violations may be cause to disqualify the individual and/or employing firm from any other future work on the campus of Indiana State University.**

1.12 FIRE ALARM SYSTEM COORDINATION WITH PROJECT WORK

A. An automatic fire detection system may in operation in areas of work. Prior to start of Work the Contractor shall verify with the Owner if devices are present in the Work area.

B. Contractor shall coordinate with Owner for the shut down and reactivation of automatic fire detection devices in work areas based on the following procedures.

1. Prior to 3:30pm on the day before work is scheduled the Contractor shall contact either Pat Teeters at 812-237-8187 (Office) or 812-230-6141 (Cellular) to request fire alarm devices be disabled. If no answer, call Brad Welker at 812-237-8109 (alternate contacts). The Contractor shall provide exact work location, the time the devices are required to be disabled by and a means by which to contact the Contractor the next day, i.e. pager or cellular phone number. It is permissible to leave a “voice mail” of the required information.
2. Prior to starting work the next day the Contractor shall contact Pat Teeters (preferred contact) or Brad Welker (alternate contact) to verify if the required devices are disabled. Please listen carefully to the voice mail announcement for information in the event of no answer.
3. Prior to leaving the job-site at the end of workday or by 3:30pm the Contractor shall contact one of the aforementioned individuals to report clearance to reactivate the devices for the evening and what, if any, devices require disabling for the following workday.

C. Failure to follow these procedures may result in fines being levied on the Contractor based on the following schedule.

- 1st failure to call and schedule in advance – Warning.
- Any subsequent failure to call and schedule in advance – $10.00 per occurrence
- 1st failure to call resulting in activation of fire alarm system – Warning or $100.00, dependent on situation as determined by the Owner.
- Any subsequent failure to call resulting in activation of fire alarm system - $100.00 per occurrence.

1.13 INSPECTION

A. At the conclusion of the entire work encompassed in this contract, written notice requesting inspection shall be submitted to the Owner at least ten (10) days prior to the anticipated inspection date.

1.14 PAYMENT AND FINAL ACCEPTANCE

A. Anticipated Draw Schedule

1. For any Project in excess of $500,000.00 the Contractor shall submit an anticipated monthly drawdown schedule.

2. This schedule shall be submitted within fourteen (14) calendar days after Award of Contract to:

   The Office of the Senior Vice President for Finance and Administration
   Rankin Hall Suite 210
   Terre Haute, IN 47809

B. Applications for Payments shall be submitted on AIA Application for Payment form G702 with Continuation Sheet G703 (or on a form approved by the Owner). While no set date is required for Applications for Payment, the application shall be submitted on a regular monthly basis for labor and materials permanently installed in the work, for material stored on site and for properly insured materials stored off-site under the following conditions:

1. For purposes of making periodic estimates, the Contractor shall furnish an itemized breakdown of his contract amount, distributed according to different classes of work. In making application for payments, the Contractor shall show, each period, the percentages of completion of each class.
2. Contractor shall send five (5) copies for each Application for Payment.
3. The Owner will make partial payment to the Contractor on the basis of a duly certified, approved estimate of the work performed during the preceding calendar month by the Contractor within 15 days after receipt by the Owner.
4. Payment will be made on balance due on labor and materials installed permanently in the work to within 90% of estimated value, and not to exceed 90% of the value of materials delivered to the site which are not subject to damage by exposure to the elements.
5. Stored materials and equipment offsite: The Owner will make payment for materials and equipment store offsite under the following conditions.
   a. The Contractor requests in writing to the Architect/Engineer/Owner for payment on offsite stored materials and equipment.
   b. The Architect/Engineer/Owner is given access to the offsite storage facility for purposes of inspection and verification of the stored materials and equipment. Any material or equipment not properly stored or protected shall not be approved for payment.
   c. The Contractor shall provide to the Architect/Engineer/Owner a current Certificate of Insurance on the remote storage facility. This insurance shall remain in force for the duration of the storage of the stored materials and equipment at the remote location.
6. The Owner, if conditions in its opinion warrant, has the right to withhold, in addition to retained percentages, such an amount or amounts from the payment to the Contractor as may be necessary to pay just unpaid claims for labor and services rendered and materials furnished in connection with the work.
7. The Owner will not approve for payment on any estimate, the value on any materials which, in his opinion, does not meet the contract requirements.
8. At the conclusion of installation and satisfactory inspection by the Owner, the work shall be acceptable for payment of an amount equal to ninety-five (95%) percent of the total contract amount.
9. Reduction or Limitation of Retainage:
   a. At the sole written discretion of Indiana State University, if acceptable progress is made, at fifty percent (50%) completion of the Contract Sum the remaining Retainage may be reduced to 0%.

b. Any subsequent Change Orders after the reduction of Retainage shall have 5% Retainage withheld.

10. **Requests for compensation, for previously approved Change Orders omitted from an Application for Payment, received sixty (60) calendar days after Owner receipt of the Final Application for Payment (Release of Retainage) shall not be honored.**
11. Final payment will be due and payable the later of sixty-one (61) days from date of receipt of the Final Application for Payment or after the Contractor has completed all punch list items, certified that all Subcontractors and Suppliers have been paid, and all claims, including the Contractor's, have been resolved. Before issuance of the final payment, the Contractor shall furnish an affidavit (Final Waiver of Lien) as evidence that there are no claims on account of the Contract, outstanding liens of claims for materials furnished, or labor performed on the work. The final payment shall constitute the acceptance of the work by the Owner, except as to work thereafter found to be defective. The date of such payment shall be regarded as the date of final acceptance of the work.
12. Warranty: The Warranty Period shall be per AIA A201-2007 Article 3 Paragraph 3.5 as amended by Specification Section 002011 Amendments to General Conditions.

C. ACH Payments

1. In an effort to expedite Contractor payments Indiana State University requests the Contractor set up an ACH account for Project Payments. Contact Catherine Procarione in the ISU Office of the Controller at 812-237-3525 to set up this account.
2. If the Contractor currently has an ACH Account with Indiana State University it is not necessary to set up an account for each Project. It is solely the responsibility of the Contractor to maintain accurate Banking information on file with the ISU Office of the Controller.

D. Special provisions regarding Retainage and Escrow:

1. The laws of the State of Indiana (IC 5-16-5.5-3 as amended) contain certain provisions regarding retainage, bonds and payment of Contractors and Subcontractors. The Contracts and Subcontracts entered into pursuant to these instructions to Bidders shall be governed by those provisions with respect to Contracts in excess of $200,000 entered into between a Contractor and the Indiana State University Board of Trustees.
2. These provisions require, among other things, that the amounts retained by the Owner from the contractor pursuant to retainage provisions be placed in an escrow agreement to be executed by the Contractor. Pursuant to these provisions, the successful Bidder shall be required to execute an escrow agreement between the Contractor and the Owner.
3. This escrow agreement shall have no application to payment withheld by the Owner pursuant to provisions of the Construction Contract intended to protect the Owner from loss on account of defective work not remedied; claims filed on reasonable evidence; failure of the Contractor to make payments when due to subcontractors or for material or labor; reasonable doubt that the contract can be completed for the balance then unpaid; damage to another contract; failure or refusal of the Contractor to prosecute the work in strict compliance with the above process schedule; or similar provision.
4. In addition, each successful Bidder will be required to comply with all applicable provisions of the statute referred to above with respect to each of his Subcontractors (as the term 'Subcontractor' is defined in the statute referred to above).
5. The Contractor shall contact Kathy Abernathy in the Office of the Senior Vice President for Finance and Administration at (812)-237-3554 to set-up this escrow account.
6. Should a Contractor fail to execute an Escrow Agreement between the Contractor and the Owner (Indiana State University Board of Trustees) the Contractor waives all claims for any interest the Contractor would have accrued had an Escrow Agreement been executed.

1.15 CONTRACTOR'S BID

A. Contractor shall submit Bid for Base Bid and any Alternate Bids as listed in Section 002000.

1.16 INVOICING

A. All invoices and/or Certificates of Payment must be addressed to:

Indiana State University
Department of Facilities Management
951 Sycamore Street
Terre Haute, IN 47809
Attention: Bryan Duncan

And sent via the Architect/Engineer
Browning Day
626 North Illinois Street
Indianapolis, Indiana 46204
Attention: Jonathan Young

Do not sent Applications for Payment to the ISU Accounts Payable Office

B. A Partial Wavier of Lien shall be submitted with every Application for Payment until the final Application for Payment (Release of Retainge) when a Final Waiver of Lien shall be submitted.

1.17 SITE LOCATION(S)

A. **ISU Dreiser Hall, 221 North 6th Street, Terre Haute, Indiana 47809**

1.18 PROJECT CONTACT

A. Questions regarding this Project shall be addressed to:

Jonathan Young
Browning Day
626 North Illinois Street
Indianapolis, Indiana 46204
E-mail jyoung@browningday.com Cell 317-432-5936 Office 317-613-4298

Note: E-mail is the preferred contact method

B. MEPT questions may be submitted directly to R.E. Dimond by e-mail only with an e-mail copy to Jonathan Young at the e-mail address above. The main R.E. Dimond contact is:

Dale Warner

E-mail dale.warner@redimond.com

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 003000

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PART 1 - GENERAL

1.01 DESCRIPTION

A. The project is located on the campus of Indiana State University at Dreiser Hall, 221 North 6th Street, Terre Haute, Indiana 47809

1.02 RELATED SECTIONS

A. Division 00 Sections

B. Division 01 Sections

C. All Division 02-33 Sections as applicable

1.03 SCOPE OF WORK – BASE BID

A. The Dreiser Hall Renovation project consists of a full building renovation of Dreiser Hall. Dreiser Hall is a ca. 1950s era classroom building that underwent a substantial renovation in the 1990s. The building will house functions from the Theater Department, the Department of Communication, and Student Media. All of these programs are within the College of Arts and Sciences. The project will include an exterior restoration of the existing masonry building envelope; new roof; new entry addition at the northwest corner; window/door replacement; new interior aesthetic; new mechanical, electrical, plumbing, and low voltage systems.

B. The following, but not limited to, is included in the Base Bid Package:

1. Exterior Restoration – Isolated masonry restoration of existing brick and limestone façade.

2. New Addition – New addition at northwest corner constructed from structural steel, steel studs, and masonry veneer.

3. Windows/Door – New exterior windows and doors at existing and new locations.

4. New Interior Aesthetic – Full renovation of interior including – new entry lobby, reconfigured performance theater, reimagined public corridors and lounge spaces, new faculty offices, new classroom and lab spaces, new theater back of house spaces.

5. New Mechanical, Electrical, Plumbing, and Low Voltage Systems – Removal of all existing systems and replacement with all new. This includes a new sprinkler system

C. Procedures

1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Base Bid into the Project.

2. Include as part of the Base Bid miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the Base Bid.

1.04 SCOPE OF WORK – ALTERNATES

A. The following, but not limited to, is included in the Alternate(s)

1. Alternate #1 – Add materials and labor for the operable function of the exterior replacement windows.

2. Alternate #2 – Add the materials and labor for wood paneling at the east face of the West Corridor 220 (on the second floor) and West Corridor 339 (on the third floor).

3. Alternate #3 – Add material and labor for the masonry restoration. Refer to Building Elevation Drawings for Areas of Restoration

4. Alternate #4 – Add materials and labor for pipe grid, curtain, mirror, and associated theatrical lighting in Room 016 – Performance and Technology Lab. All power infrastructure and rough ins are part of base bid.

5. Alternate #5 – Add materials and labor associated with opening up Stair #2. This would include demolition of existing wall, installation of storefront at 1st floor, installation of guard rail at 2nd and 3rd floors, finishing of stair stringer, and all other associated work.
6. Alternate #6 – Add materials and labor for select areas of glazed wall system on 1st and 3rd floors.
7. Alternate #7 – Add materials and labor for reroofing work. This would include demolition of existing ballasted roof system down to decking; demolition of coping and flashing; demolition of select rooftop equipment; and installation of new membrane roof system with associated flashings and copings.
8. Alternate #8 – Add materials and labor for new stage lift. This would include demolition of existing structure under stage; installation of lift unit; detailing around lift opening in stage. All power infrastructure and rough ins are part of base bid.

B. 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.

C. Procedures

1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Alternate into the Project.
2. 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.
3. 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 modifications to Alternates.
4. Execute accepted Alternates under the same conditions as other work of the Contract.

D. Selection and Award of Alternates: The Owner reserves the right to selectively accept or reject Alternates at their discretion and is under no obligation to accept any Alternates.

1.05 BID SUBMISSION REQUIREMENTS

A. Bids shall be submitted on the included Bid Form (Section 002000) and will be reviewed and accepted or rejected at the Owner's option.

B. All Bids shall be held for a period of One Hundred Twenty (120) Calendar days after submission of the Bid.

1.06 RELATED WORK SPECIFIED ELSEWHERE

A. The Prime Contractor shall be aware, and shall make his subcontractors aware that the requirements in the sections of Divisions 00 and 01 pertain to all the work and they are binding on each section of these specifications as if they were repeated in each section in their entirety.

B. The Prime Contractor shall be responsible for understanding the scope and intent of the work in all sections of these Specifications

C. The Prime Contractor is responsible for review of all sections of the Specifications and all Drawings to confirm any additional areas of responsibility.

D. All Contractors are responsible for their area of work which might show up only on a drawing from another series or Specification section.

1.07 CONTRACTS

A. Work shall be performed under one Prime Contract.

1.08 PRIME CONTRACTOR'S DUTIES

A. Project Supervision: see Section 002020 item 1.09 for requirements

B. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment
   2. Tools, construction equipment and machinery
   3. Other facilities and services necessary for proper execution and completion of work

C. Pay legally required State and Federal Taxes.

D. Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay. Contractor shall coordinate his work in advance with all other trades and report immediately any difficulty which can be anticipated.

E. The Contract Documents shall be carefully studied by the Contractor during the course of construction. Any errors in layout or errors of omission which are discovered shall be referred immediately to the Architect/Engineer for interpretation or correction.

F. Secure and pay for, as necessary for proper execution and completion of work, and as applicable at time of receipt of bids:

   1. Permits
   2. Licenses

G. Give required notices.

H. Comply with codes ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.

I. Promptly submit written notice to Architect/Engineer of observed variances of Contract Documents from legal requirements.

J. Enforce strict discipline and good order among employees.

K. Coordinate delivery and installation dates with Architect/Engineer and Owner and incorporate into Construction Schedule.

L. Prepare and update Construction Schedule.

M. Notify and receive approval from the Owner at least 48 hours in advance for utility connections, or shut-off. Coordinate these operations with the Owner, through the Architect/Engineer, and complete the work in the minimum amount of time.

N. Notify the Architect/Engineer in writing when work is completed and keep the Architect/Engineer informed of the progress of the work. No work shall be closed or covered until it has been inspected and approved. Should work not inspected be covered, uncover all such work so that it can be properly inspected and after such inspection, properly repair and replace all of the work at no additional cost to the Owner.

O. Where the Contract Documents require any work to be tested, the Architect/Engineer shall be notified sufficiently in advance so that he may observe such tests.

P. Contractor shall submit a copy of any permits he has secured before starting work on this project unless otherwise stated by Owner.

Q. Where the Contract Documents require the use of AIA Documents including, but not limited to, G702 Application and Certificate for Payment and G703 Continuation Sheet.

1.09 OTHER REQUIREMENTS

A. Nightly the Prime Contractor shall secure the construction site to discourage unauthorized individuals from accessing the site. Special effort to secure the site shall be made on Friday evenings.

B. While the site shall be kept orderly at all times, weekly the Prime Contractor shall clean-up the construction site of:

   1. Any accumulated trash and rubbish.
   2. Dirt, dust, mud, etc. associated with the construction process.
   3. Salvaged materials not slated for re-use and excess materials not slated for use.

C. Weed and grass control: The Prime Contractor shall maintain weeds or grasses to less than 6” in height where applicable

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 011000

012360
ALLOWANCES

PART 1 – GENERAL

1.01 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.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. 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. Contingency allowances.
4. Testing and inspecting allowances.
5. Quantity allowances.

C. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.03 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Architect 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'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 from the designated supplier.

1.04 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.05 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.06 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.07 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.02 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.

3.03 SCHEDULE OF ALLOWANCES

A. Allowance # 1: A $20,000 allowance shall be included in the Base Bid for the A/E to create record drawings. These drawings shall be based on the Contractors field mark-ups of the Construction Documents. The Contractor is solely responsible to provide accurate mark-ups for the creation of these record drawings. Should it be discovered that errors exist in the record drawings the Contractor shall pay for the re-creation of accurate record drawings at no additional cost to the Owner.

B. Allowance # 2: A $300,0000 Allowance shall be included in the Base Bid for Unforeseen Conditions and General Construction Contingency. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to this Allowance. Any unused Allowance monies shall be returned to the Owner at Project closeout by Change Order.

END OF SECTION 012360

012370
UNIT PRICES

PART 1 – GENERAL

1.01 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.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.03 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form in Appendix B, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.04 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices or as listed herein.

C. Owner 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 Owner's expense, by an independent surveyor acceptable to Contractor.

D. All Unit Prices provided at the time of Bid submission shall remain in effect for the duration of the Project.

E. List of Unit Prices: A list of unit prices is included at the end of this Section.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 LIST OF UNIT PRICES

A. Unit Price #1 – Repointing – Provide materials and labor cost per square foot for brick repointing.

B. Unit Price #2 – Plaster Patching – Provide materials and labor cost per square foot for plaster patching. Surface should be prepared to receive paint system. Paint system is not included in square footage price.

END OF SECTION 012370

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012500
CONTRACT CONSIDERATIONS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Schedule of Values

B. Application for Payment

C. Change procedures

D. Alternates

E. Substantial Completion

F. Final Completion

1.02 SCHEDULE OF VALUES

A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or similar form.

B. Submit Schedule of Values electronically in PDF format within 15 calendar days after date of the Award Letter.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization, bonds and insurance, and other overhead costs.

D. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

E. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

F. Revise schedule if additional Alternates are Awarded after the initial Award by adding these Alternates as separate line items broken down in detail as was provided in the initial approved Schedule of Values.

G. Revise schedule to list approved Change Orders, broken down in detail as was provided in the initial approved Schedule of Values.

H. Submit "Consent of Surety to Schedule of Values" with Schedule of Values.

1.03 APPLICATIONS FOR PAYMENT

A. Submit four (4) copies of each application on AIA Form G702- Application and Certificate for Payment and AIA G703 - Continuation Sheet or similar.

B. Content and Format: Utilize most current approved Schedule of Values for listing items in each Application for Payment.

C. Payment Period: As indicated in the Contract Documents.

D. Waiver of Liens.

E. Include Certified Payroll forms if required by Owner.

1.04 CHANGE PROCEDURES

A. The Architect/Engineer will advise of minor changes in the Work not involving and adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2007 Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710 or ISU Form SI/FCC-12.

1. The Architect/Engineer may issue a Request for Proposal (RFP) which includes A detailed description of a proposed change, with supplementary or revised Drawings and

Specifications if required. Contractor shall prepare and submit an estimate within10 calendar days, listing if:

a. A change in Contract Time for executing the change is requested.

b. A stipulation of any overtime work required

c. The period of time during which the requested price will be considered valid, but not less than 21 calendar days.

B. The Contractor may propose changes by submitting a request for change, Change Proposal (CP), to the Architect/Engineer, describing the proposed change and its full effect on the Work.

1. Include a statement describing:

a. The reason for the change.

b. The effect on the Contract Sum/Price and Contract Time with full documentation.

c. A statement describing the effect on Work by separate or other Contractors.

d. A stipulation of any overtime work required.

e. The period of time during which the requested price will be considered valid, but not less than 21 calendar days.

C. RFP and CP Pricing

1. Project Supervision costs:

a. Section 002020 Item 1.09 states in part:

"The Prime Contractor shall maintain on the Project site a competent Project Superintendent at all times any work is being performed; either by the Prime Contractor's workers or any Subcontractor's workers."

b. There shall be no costs included in the pricing of a RFP or CP for Project Superintendent's Supervision Hours while the work is being performed unless the Work included in the RFP/CP pricing will occur at a time not with-in the normal scheduled Project hours of construction.

2. Contractor Mark-up and Allowable Charges

a. Section 002011 2.07 Subparagraph 3.3.3.7, 3.3.3.8 and 3.3.3.9 states:

".7 Extra Work shall be performed for the cost of the labor payroll plus 15% of the labor payroll and the cost of the material plus 5% of the material cost. Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work. Labor payroll is defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.

.8 In case such Work is performed by a Subcontractor or a lower tier Contractor with the Owner's consent, the Work shall be marked up as indicated in 7.3.3.7 by the Contractor actually performing the Work. Each succeeding Contractor may mark up their direct labor and material costs as indicated in 7.3.3.7. Otherwise each succeeding Contractor, including the Prime Contractor, may add 5% for handling/ coordination. Additional mark-ups of a Subcontractor's costs shall not be permitted.

".9 Costs for bond premiums are allowable provided documentation from the Bonding Company is included detailing the added bond cost premium, the current bond total and the new bond total."

b. Labor charges subject to the 15% mark-up shall be based on the actual labor payroll defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.". The Wage Rate Schedule, submitted as required by the Contract Documents, shall be used to determine if the hourly labor rate used for pricing and labor mark-up is correct.

c. Insurance, Taxes and similar shall not be included in the RFP or CP pricing since, per 3.3.3.7, "Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work".

3. All RFP and CP pricing shall be submitted in enough detail for the Architect/Engineer and Owner to properly evaluate the proposed pricing. These pricing details extend to the lower tier Subcontractor's pricing as well. The Architect/Engineer and Owner may request additional pricing breakdown if in their opinion insufficient pricing detail was provided for evaluation. The Contractor shall promptly provide the additional pricing detail.

D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer and Owner.

E. Construction Change Directive: Architect/Engineer may issue a directive, on AIA Form G713 or ISU Form CCD-12 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

F. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

G. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.05 ALTERNATES

A. Alternate Bid prices shall be held for one hundred twenty (120) days from date of Bid.

B. Alternate Bids may be used as the basis for Award of Contract.

C. The Owner may Award none, some or all Alternates submitted.

D. The Owner is under no obligation to accept any Alternates submitted.

E. Accepted Alternates shall be listed as separate line items on the Schedule of Values broken down as directed by the Architect/Engineer/Owner.

1.06 SUBSTANTIAL COMPLETION

A. The substantial completion date shall be as listed in Section 001010 INSTRUCTIONS TO BIDDERS. The substantial completion date may be adjusted as allowed by the Contract Documents or as mutually agreed upon in writing by the Owner and Contractor.

B. **Should a Contractor list an early substantial completion date on their Project Schedule or any Project Document, this early substantial completion date shall not be permitted to be used as a claim for additional compensation for the Contractor's failure to meet their early substantial completion date.**

C. Warranty: The Warranty Period shall commence at substantial completion per AIA A201-2007 Article 3 Paragraph 3.5 as amended by Specification Section 002011 AMENDMENTS TO GENERAL CONDITIONS.

1.07 FINAL COMPLETION

A. The Contractor's final Application for Payment (Release of Retainage) shall not be approved for payment until all punch list items are complete, all claims (Contractor and Subcontractor) have been resolved and all conditions of Section 017700 PROJECT CLOSEOUT have been met.

B. Requests for compensation, for previously approved Change Orders omitted from an Application for Payment, received sixty (60) calendar days after receipt of the Final Application for Payment (Release of Retainage) shall not be honored.

C. Final payment will be due and payable the late of sixty-one (61) days from date of receipt of the Final Application for Payment or after the Contractor has completed all punch list items, certified that all Subcontractors and Suppliers have been paid, and all claims, including the Contractor's, have been resolved. Before issuance of the final payment, the Contractor shall furnish an affidavit (Final Waiver of Lien) as evidence that there are no claims on account of the Contract, outstanding liens of claims for materials furnished, or labor performed on the work. The final payment shall constitute the acceptance of the work by the Owner, except as to work thereafter found to be defective. The date of such payment shall be regarded as the date of final acceptance of the work.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 012500

COORDINATION AND MEETINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Coordination.

B. Field engineering.

C. Preconstruction meeting.

D. Progress meetings.

E. Field Record Drawings and Specifications

1.02 COORDINATION

A. Coordination scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provision for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. The Contractor shall provide coordination drawings for above-ceiling areas where at least two different services run in parallel or cross one another. Drawings are to be submitted, reviewed by the consultant team, and returned to the contractor prior to the start of any installation in these areas.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

G. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 FIELD ENGINEERING

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that established by Owner provided survey and/or shown on Drawings.

C. Verify set-backs and easements, confirm drawing dimensions and elevations.

D. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

E. Submit a copy of registered site drawing and certificate signed by the Land Surveyor that the elevations and locations of the Work is in conformance with the Contract Documents.

1.04 PRECONSTRUCTION MEETING

A. Architect/Engineer will schedule a meeting after Notice of Award.

B. Attendance Required: Owner, Architect/Engineer, Contractor and major subcontractors.

C. Agenda:

1. Introductions.

a. Official Project Name and Number (to appear on all Project correspondence)
b. Designation of personnel representing the parties in Contract, Owner and the Architect/Engineer

2. Status of required paperwork to ISU Purchasing Department.
3. Distribution of Contract Documents.
4. Submission of full list of sub-contractors and suppliers, schedule of values, proposed pay application schedule and proposed project schedule.
5. Procedures and processing of submittals, substitutions, field decisions, proposal request, Change Orders, and Contract closeout procedures.
6. Scheduling activities of a Testing Agency (if required).
7. Use of premise by Owner and Contractor.
8. Owner's requirements and partial occupancy.
9. Construction facilities and controls provided by Owner.
10. Temporary utilities.
11. Survey and building layout.
12. Security and housekeeping procedures.
13. Procedures for testing.
14. Procedures for maintaining record documents.

D. Architect/Engineer to record minutes and distribute copies within seven (7) days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

1.05 PROGRESS MEETINGS

A. Schedule and attend meetings throughout progress of the Work at maximum monthly intervals.

B. Architect/Engineer will make arrangements for meetings, prepare agenda with copies for participant and preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, and Architect/Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule
13. Other business relating to Work.

E. Architect/Engineer to record minutes and distribute copies within seven (7) days after meeting to participants, with copies to the Owner, and those affected by decisions made.

1.06 FIELD PROJECT RECORD DOCUMENTS

A. Documents and Samples at the Site:

1. General: The Prime Contractor shall maintain at the site for the Owner and A/E a record copy of the Drawings, Specifications, addenda, bulletins, Architect/Engineer's Supplemental Instructions, and Change Orders, in good order and marked currently to record changes and selections made during construction, and in addition reviewed Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Owner and the Architect/Engineer review.

2. Posting:

a. Record Drawings: Keep a complete record of the locations of all items indicating the Work as actually installed. Changes and deviations are to be indicated on the Record Contract Drawings. Give particular attention to concealed work which would be difficult to identify, measure, and record at a later date. The Subcontractor shall record concealed items, changes, and deviations under the direction of the Contractor as the Work progresses. The Contractor shall clearly identify all deviations from the Contract Documents.

b. Record Specifications: Indicate the changes made by addendum, bulletin, Architect/Engineer's Supplemental Instructions, and Change Order. Indicate the manufacturer selected for all items whether specified proprietarily or generally.

c. No review of record documents by the Architect/Engineer/Owner shall be a waiver of deviations from the Contract Documents or the submittals, or in any way relieve the Contractor from his responsibility to perform the Work in accordance with the Contract Documents.

PART 2 - NOT USED

PART 3 – NOT USED

END OF SECTION 013100

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PART 1 - GENERAL

1.01 DESCRIPTION

A. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.

B. To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data and for its review by the Architect/Engineer.

C. The Architect/Engineer's review of Contractor's material submittal shall not relieve the Contractor of responsibility for errors, omission, quantities, or capacities even though work is executed in accordance with the approved submittal material.

D. The checking of the Contractor's Material Submittal is a gratuitous assistance and the Architect/Engineer does not thereby assume responsibility or liability for errors or omissions. Where such errors or omissions are discovered later, they shall be made good by the Contractor, irrespective of any approval by the Architect/Engineer since Contractor's Proposal assumes a complete, operable, and acceptable installation.

E. Work Included:

1. Submit, to the Architect/Engineer, shop drawings, project data and samples required by Specification sections electronically in PDF format.

2. Simultaneous to submitting to the Architect/Engineer, the Contractor shall submit to the Owner’s designated contacts a copy of all submittals provided to the Architect/Engineer in PDF Format.

3. All submittals shall be separated by CSI format and shall list the appropriate CSI 6-digit code on the PDF file name. Submittal packages which include items listed under different Specification sections shall be submitted as separate PDF Files. Multiple submittals at different times under the same Specification Section shall have file name extension added to indicate the number of the submittal, e.g. 265100(1), 265100(2), etc.

4. Designate in construction schedule dates for submission and dates reviewed shop drawings, project data and samples will be needed for each product in order to maintain the progress of construction as scheduled. Also indicate critical delivery dates of all items.

1.02 PRODUCT HANDLING

A. Make all submittals of shop drawings, samples, requests for substitution, and other similar items, in strict accordance with the provisions of this section of these Specifications.

1.03 DEFINITIONS

A. Shop Drawings:

1. Original drawings, prepared by Contractor, subcontractor, supplier or distributor, which illustrate some portion of the work; showing fabrication, layout, setting or erection details

a. Prepared by a qualified detailer

b. Identify details by reference to sheet and detail numbers shown on contract drawings.

B. Product Data:

1. Manufacturer's standard schematic drawings:

a. Modify drawings to delete information which is not applicable to project.

b. Supplement standard information to provide additional information applicable to project.

2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.

a. Clearly mark each copy to identify pertinent materials, products, or models.

b. Show dimensions and clearances required.

c. Show performance characteristics and capabilities.

d. Show wiring diagrams and controls.

3. Material and Safety Data Sheets shall be furnished for all applicable Project Materials.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS

A. Scale required: Unless otherwise specifically directed by the Architect/Engineer, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.

B. All shop drawings shall be submitted electronically in PDF Format to the Architect/Engineer with a simultaneous submission to the Owners designated recipients.

C. Accompany shop drawings with transmittal letter containing:

1. Date and revision dates

2. Project title and number

3. The names of:

a. Architect/Engineer

b. Contractor

c. Subcontractor

d. Supplier

e. Manufacturer

f. Separate detailer when pertinent

4. Identification of product or material

5. Relation to adjacent structure or materials

6. Field dimensions, clearly identified as such

7. Specification section number

8. Applicable standards, such as ASTM number of Federal Specification

9. A blank space 2-1/2" x 3", for the Architect/Engineer's electronic stamp

D. Identification of deviations from Contract Documents

E. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents. Any materials submitted without the Contractor's stamp of approval will be returned to the Contractor with no action taken.

F. Reviewed shop drawings shall be returned to the Contractor and Owner’s designated

recipients electronically stamped as follows:

1. Reviewed
2. Reviewed as Noted
3. Rejected - Resubmit

G. The Owner shall submit their review comments to the Architect/Engineer. Official Review of shop drawings shall be by the Architect/Engineer only. The Contractor shall not proceed based on Owner comments only unless the Owner is the Architect/Engineer.

2.02 SUBMITTALS

A. All submittals for materials and equipment shall be made within 40 days of award of the contract and in no case shall any materials or equipment be delivered to the job site until submittals have been reviewed by the Architect/Engineer and Owner. This requirement will be a condition for approval of subsequent Applications for Payment.

B. All submittals shall be submitted electronically in PDF Format to the Architect/Engineer with a simultaneous submission to the Owner’s designated recipients.

C. Submittals which reflect color samples shall be submitted in color.

D. Accompany submittals with transmittal letter containing:

1. Date and revision dates
2. Project title and number
3. The names of:
    a. Architect/Engineer
    b. Contractor
    c. Subcontractor
    d. Supplier
    e. Manufacturer
    f. Separate detailer when pertinent
2. Identification of product or material
3. Relation to adjacent structure or materials
4. Field dimensions, clearly identified as such
5. Specification section number
6. Applicable standards, such as ASTM number of Federal Specification
7. A blank space 2-1/2" x 3", for the Architect/Engineer's electronic stamp

E. Identification of deviations from Contract Documents

F. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents. Any materials submitted without the Contractor's stamp of approval will be returned to the Contractor with no action taken.

G. Reviewed submittals shall be returned to the Contractor electronically stamped as follows:

1. Reviewed
2. Reviewed as Noted
3. Rejected - Resubmit

H. The Owner shall submit their review comments to the Architect/Engineer. Official Review of submittals shall be by the Architect/Engineer only. The Contractor shall not proceed based on

Owner comments only unless the Owner is the Architect/Engineer.

2.03 SAMPLES

A. Physical samples as defined by the General Conditions shall be furnished to the Architect/Engineer for approval prior to ordering or fabrication of any product.

B. Submit samples as specified in each of specification sections.

C. Submit an electronic transmittal or review sheet stamped by the Contractor with a blank space for the Architect/Engineer's electronic stamp.

2.04 SUBSTITUTIONS DURING CONSTRUCTION

A. The approved "Suppliers and Manufacturers List" is an essential part of the Contract. Substitutions of materials, equipment, etc. require the written approval of the Architect/Engineer and Owner. Substitutions during construction will only be considered when there is a proven benefit to the Owner. It is at the sole discretion of the Architect/Engineer and Owner to determine if the substitution is warranted.

1. The Architect/Engineer and Owner will consider proposals for substitution of specified materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect/Engineer and Owner to evaluate the proposed substitution. Also, submit with request accurate cost data on the proposed substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.

2. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Architect/Engineer and Owner.

3. Requests for substitution, when forwarded by the Contractor to the Architect/Engineer and Owner, are understood to mean that the Contractor:

a. Represents that they have personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

b. Will provide the same guarantee for the substitution that they would for that specified;

c. Certifies that the cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate contracts and the Architect's redesign cost, and that he waives all claims for additional cost related to the substitution which subsequently become apparent;

d. Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

B. See Section 001010 INSTRUCTIONS TO BIDDERS Item 1.08 for requirements for substitutions prior to Bid.

PART 3 – NOT USED

END OF SECTION 013200

014000
QUALITY CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - control of installation.

B. Tolerances

C. References.

D. Mockup.

E. Inspecting and testing laboratory services.

F. Manufacturer's field services and reports.

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions, including each step in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

G. Perform clash and interference detection and coordination of the Revit model.

1. ~~1.~~ The A/E Revit model will be made available to the Contractor upon execution of a CAD/BIM waiver.

2. ~~2.~~ ~~T~~The Contractor is to acquire and coordinate the Revit models of all Contractor trades.

3. ~~3.~~ The Contractor is responsible for modeling and coordinating design-build trades such as fire sprinkler.

~~F.~~4. ~~4.~~ The Contractor shall alert the Architect in writing of any clashes detected within the Architect/Engineer's Revit model that require resolution by the A/E team.

1.03 TOLERANCES

A. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.04 REFERENCES

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A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect/Engineer shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 INSPECTING AND TESTING LABORATORY SERVICES

A. See Section 014100 for requirements for the selection of Inspection and Testing Laboratory Services Testing Agency (Agencies) and responsibility for payment for these services.

B. An independent firm will perform inspections, tests, and other services specified in individual specification sections and as required by the Architect/Engineer or the Owner.

C. Inspecting, testing, and source quality control may occur on or off the project site. Perform off-site inspecting or testing as required by the Architect/Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

F. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.

G. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

H. Testing or inspecting does not relieve Contractor to perform Work to contact requirements.

I. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for retesting will be paid by the Contractor.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observations. Observer subject to approval of Architect/Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

D. Submit report in duplicate within 30 days of observations to Architect/Engineer for information.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 014000

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 SUMMARY

A. This Section describes testing and inspecting to be provided by the Contractor, plus cooperation required from the Contractor with the Owner's selected testing agency and others responsible for testing and inspecting the Work. This Section supersedes all references within the Contract Documents to Contractor provided testing.

B. Related Work:

1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 01 of these Specifications.

2. Requirements for testing may be described in various Sections of these Specifications.

3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

C. Work not included:

1. Selection of testing laboratory: The Owner will select a prequalified independent testing laboratory.

2. Selection of construction soil engineer: The Owner will select a prequalified independent soil engineer to observe performance of Work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests.

1.02 QUALITY ASSURANCE

A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

C. Promptly process and distribute required copies of test reports and related instructions to assure necessary testing and replacement of materials with the least possible delay in progress of the Work.

PART 2 – PRODUCTS

2.01 PAYMENT FOR TESTING

A. Initial services of testing laboratory:

1. The Owner will pay for initial services requested by the Owner.

2. When initial tests indicate non-compliance with the Contract Documents, the costs of all tests associated with that non-compliance will be deducted by the Owner from the Contract Sum.

B. Initial services of Construction Soil Engineer:

1. The Owner will pay for initial services requested by the Owner, including but not necessarily limited to, observing performance of Work in connection with excavating, trenching, filling, backfilling and grading.

2. The Owner will pay for compaction tests performed by the construction soil engineer, but will deduct from the Contract Sum the costs for compaction tests performed to prove compliance with codes or ordinances.

3. Retesting: When initial tests indicate non-compliance with the Contract Documents, subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency, and costs thereof will be deducted by the Owner from the Contract Sum.

2.02 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

2.03 CONTRACTOR'S CONVENIENCE TESTING

A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3 – EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.02 TAKING SPECIMENS

A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.03 SCHEDULES FOR TESTING

A. Establishing schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide testing laboratory with a minimum of 24 hours advance notice.

3. Provide all required time within the construction schedule.

B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

END OF SECTION 014100

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and the codes and standards imposed upon the work. The requirements include the obtaining of permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.

B. "Regulations" is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

C. Governing Regulations: Refer to General and Supplementary Conditions for requirement related to compliance with governing regulations.

1.03 DEFINITIONS

A. General Explanation: A substantial amount of specification language consists of definitions for terms found in other Contract Documents, including drawings. (Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated thereon). Certain terms used in Contract Documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the work to the extent that they are not stated more explicitly in another element of the Contract Documents.

B. General Requirements: The provisions or requirements of Division-1 sections apply to entire work of Contract and, where so indicated, to other elements which are included in project.

C. Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled" and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted", mean "directed by Architect/Engineer", "requested by Architect/Engineer", and similar phrases. However, no such implied meaning will be interpreted to extend Architect's/Engineer's responsibility into the Contractor's area of construction supervision.

E. Approve: Where used in conjunction with Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be held to limitations of Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

F. Project Site: The term "project site" is defined as the space available to the Contractor for performance of the work, wither exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings, and may or may not be identical with description of the land upon which project is to be built.

G. Furnish: Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations, as applicable in each instance.

H. Install: Except as otherwise defined in greater detail, term "install" is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

I. Provide: Except as otherwise defined in greater detail, term "provide" means to furnish and install, complete and ready for intended use, as applicable in each instance.

J. Installer: The term "installer" is defined as the entity (person or firm) engaged by the Contractor, its Subcontractor or Sub-subcontractor for performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a requirement that installers be expert in the operations they are engaged to perform.

K. Testing Laboratories: The term "testing laboratory" is defined as an independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and, if required, interpret results of those inspections or tests.

1.04 PROJECT MANUAL FORMAT AND CONTENT EXPLANATION

A. General: This article is provided to help the user of these specifications more readily understand the format, language, implied requirements and similar conventions of content. None of the following explanations shall be interpreted to modify the substance of the contract requirements.

B. Production Methods: Portions of these specifications have been produced by the Architect's/Engineer's standard method of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a natural result of this production technique, and no other meaning shall be implied.

C. Project Manual Format: These specifications are organized based upon the Construction Specifications Institute's 16-Division format. The organization of these specifications into Divisions, Sections or Trade Headings generally conforms to recognized industry practice.

1. Divisions are groupings of related or similar sections. The divisions are recognized as the construction industry consensus method of uniform specification organization.

2. Sections: For convenience, "Sections" are considered as the basic units of work. The section title is descriptive only and not intended to limit the meaning or content of a section or to be completely descriptive of requirements specified therein.

3. Section Numbering is used to facilitate cross-references in the Contract Documents. Sections are placed in the Project Manual in numeric sequence; however, the numeric sequence is not complete and the listing of the section in the "Index" at the beginning of the Project Manual must be consulted to determine the numbers and names of specifications sections in the Contract Documents.

D. Project Identification: The project number of the Contract Documents is recorded at the bottom left of each page of the specifications.

E. Page Numbering: Pages are numbered independently for each section. The section number is shown together with the page number at the bottom of each page to facilitate the location of text in the Project Manual.

F. Text Subordination: Portions of specification text are subordinated to other portions in the following manner:

1. Certain sections may be subordinate to other sections or parts of other sections. When that occurs, the degree of subordination is described in t hose sections.

2. Sub-articles, which are printed in upper/lower case lettering, are subordinate to Article titles.

3. Paragraphs and lines of text are subordinate to sub-article titles.

4. Paragraphs and lines of text that are indented from the left margin are subordinate to the preceding text that is either not indented, or is indented by a lesser amount.

G. Project Manual Content: This project specification has been produced employing certain conventions in the use of language as well as conventions regarding the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. In certain circumstances, the language of the specifications and other Contract Documents is of the abbreviated type. It implies words and meanings that will be appropriately interpreted. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where the full context of the Contract Documents so indicates.

2. Imperative language is generally used in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by Contractor. At certain locations in the text, for clarity of reading, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by Contractor or, when so noted, by others.

H. Methods of Specifying: The techniques or methods of specifying requirements varies throughout the text.

1. The method used for specifying one unit or work has no bearing on requirements for another unit of work.

2. Methods of specifying may include the following, or any combination of the following:

a. Prescriptive.

b. Open-generic-descriptive.

c. Performance.

d. Proprietary.

e. Compliance with reference standards.

I. Specialists Assignments: In certain instances, specification text requires or implies that specific elements of the work are to be assigned to specialists or expert entitles, who must be engaged for the performance of the work. Such assignments are intended to establish which part or entity involved in a specific element of the work is considered as being sufficiently experienced in the indicated construction processes or operations to be recognized as "expert" in those processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of all contract requirements remains with the Contractor.

J. These requirements should not be interpreted to conflict with the enforcement of building codes and similar regulations governing the work. They are also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

K. Trades: Except as otherwise indicated, the use of titles such as "Carpentry" in specification text, is not intended to imply that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"). It is also not intended to imply that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

1.05 DRAWING SYMBOL

A. General: Except as otherwise noted indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., latest edition.

B. Mechanical/Electrical Drawings: Graphic symbols used on mechanical/electrical drawings are generally aligned with symbols recommend by ASHRAE. Where appropriate, these symbols supplemented by more specific symbols as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to the Architect/Engineer for clarification before proceeding.

1.06 INDUSTRY STANDARDS

A. General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written into the Contract Documents, applicable standards of the construction industry have the same force and effect as if copied directly into the Contract Documents. Such industry standards are hereby made a part of the Contract Documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available for reference at the project site.

B. Referenced standards (standard referenced directly in Contract Documents) have precedence over non-referenced standards which are recognized in industry for applicability to work.

C. Non-referenced standards are hereby defined as not being applicable to the work, except as general requirement of whether the work complies with recognized construction industry standards.

D. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.

E. Updated Standards: At the request of the Architect/Engineer, Contractor or governing authority, submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of the Contract Documents and before the performance of the work affected. The Architect/Engineer will decide whether to issue the change order to proceed with the updated standard.

F. Conflicting Requirements: Where compliance with 2 or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. 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.

G. Minimum Quantities or Quality Levels: In every instance, the quantity or quality level shown or specified is intended to be the minimum for the work to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Architect/Engineer for decision before proceeding.

H. Copies of Standards: Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with recognized industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.

I. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.

J. Although certain copies of standards needed for enforcement of the requirements may be required submittals, the Architect/Engineer reserves the right to require the Contractor to submit additional copies of these standards as necessary for enforcement of the requirements.

K. Abbreviations and Names: Where acronyms or abbreviations are used in the specifications or other Contract Documents they are defined to mean the industry recognized name of the

trade association, standards generating organization, governing authority or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

1.07 GOVERNING REGULATIONS/AUTHORITIES

A. General: The procedure followed by Architect/Engineer has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing Contract Documents; recognized that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions having a bearing on performance of work.

B. Trade Union Jurisdictions: The Contractor shall maintain, and shall require Prime Subcontractor to maintain, complete current information on jurisdictional matters, regulations actions and pending actions, as applicable to the work. Discuss new developments at appropriate project meetings at the earliest feasible dates, and record information of relevance along with the actions agreed upon. The manner in which Contract Documents have been organized and subdivided is not intended to be an indication of jurisdictional or trade union agreements. Assign and subcontract the work, and employ trades-men laborers, in a manner which will not unduly risk jurisdictional disputes of kind which could result in conflicts, delays, claims and losses in the performance of the work.

1.08 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 014200

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PART 1 – GENERAL

1.01 CONTRACTOR'S USE OF PREMISES AND FACILITIES

A. Confine operations at site to areas permitted by:

1. Construction Limits
2. Contract Documents
3. Written Owner Approval

B. Do not load structure with weight that will endanger structure or existing adjacent structures including any subsurface construction.

C. The Prime Contractor shall assume full responsibility for protection and safekeeping of product stored on premises.

D. The Prime Contractor shall move any stored products which interfere with operations of Owner or other Contractor.

E. The activities of the Prime Contractor, including his subcontractors, material suppliers, employees, and others engaged in the work, shall be strictly limited to the Owner's property. Under no circumstances shall parking, material storage, or other uses of adjacent private property be permitted. Locations of storage areas, field office, parking areas, and the like on the project site shall be only within the construction limits as indicated on the drawings or as approved by the Owner.

F. Use of Installed Work: Construction personnel may use toilet facilities, sink, and other fixtures and equipment installed in work only as expressly permitted by Architect/Engineer or Owner. Any privileges granted may be revoked if abused.

G. Construction personnel shall exercise care and shall provide whatever protective measures are required to assure that their particular portions of the work do not damage or alter portions of the work that have been previously installed, either partially or completely. All work so damaged or altered shall be repaired or replaced to the satisfaction of the Architect by the party whose work has been affected, and the expense thereof shall be borne by the party who caused the damage or alteration.

H. Protection of Floors: In interior areas used for construction or field "shops", protect floors from physical damage, oil drippings, and other staining which might impair bonding of new floor coverings, utilizing such methods as heavy polyethylene covering, sawdust or sand boxes, rigid insulation or the like.

1.02 FIELD OFFICE

A. The Prime Contractor and their Sub-Contractors shall be responsible for their own field office.

B. The Prime Contractor shall provide telephone service, including cellular phone for the on-site foreman, for the duration of the project.

C. Provide at all times fire extinguishers as required by applicable codes and regulations.

D. Post in a conspicuous space near the telephone, pertinent emergency phone numbers and notices as may be required by governing authorities and fire protection department.

1.03 SITE PROTECTION

A. Contractor shall adhere to Factory Mutual Engineering and Research (FM) "Cutting and Welding" permit system. Permits are available through the Office of Environmental Safety’s Fire Specialist Office at 812-237-4020.

B. Prime Contractor shall provide a one hour fire watch at the end of each workday when any cutting or welding occurred to assure that no possibility of fire exists from any work performed that day.

1.04 TEMPORARY ELECTRIC SERVICE

A. Responsibility: The Prime Contractor shall be allowed to utilize the Owner's electricity for all construction purposes. The Prime Contractor shall arrange for the distribution and continuance throughout the work and the removal at the completion of the work of temporary electrical service. All electrical installations shall be by a Licensed Bonded Electrical Contractor. All elements of such temporary electric service shall conform to the regulations of the National Electric Code, current edition, and OSHA. All temporary wiring shall include a green equipment grounding conductor, and the entire temporary electrical service shall have equipment grounding continuity; all outlets for the connection of portable equipment shall be of the GFCI type. The Contractor shall provide all necessary wiring. The Prime Contractor or their Sub Contractor shall provide extension cords, outlets, etc. required to extend temporary service from nearest outlets of adequate capacity for the power required to points of usage.

B. Distribution Wiring: The temporary distribution wiring shall be adequate to provide whatever is required for the operation of 120 volts, single-phase portable tools and equipment not exceeding one horsepower; the distribution wiring shall provide a receptacle within 50 feet of all portions of the building area.

C. Temporary Lighting: The Prime Contractor shall provide all wiring, light bulbs and fixtures necessary to furnish temporary lighting of one watt per sq. ft. of construction area, but provide a minimum of one light in each enclosed space. Keep such temporary lighting in operation during all working periods.

D. Supervision: The Prime Contractor shall maintain strict supervision over the use of the temporary electrical service and shall be responsible for damages incurred by misuse.

1.05 TEMPORARY WATER SERVICE

A. The Prime Contractor may use the Owner's existing water service for construction purposes. The Prime Contractor shall provide and maintain leak-free, all hoses, fitting, nozzles, and the like required to distribute water to points of usage. Maintain strict supervision over use and waste of water. Take care not to spill or run water in any part of the building. Repair, replace, or restore (whichever may be deemed necessary by the Architect/Engineer) at no additional cost to the Owner, all work, new or existing, including equipment, furnishings, machines, finished surfaces, and the like which may be damaged by water due to construction operations, and by the misuse of such temporary water service. At completion of the work remove all temporary water distribution items.

1.06 TEMPORARY HEAT

A. It shall be the Prime Contractor's responsibility to furnish and pay for all heat for all trades during the period of construction as described herein for the building. The Prime Contractor shall provide portable heating equipment and fuel and necessary electrical connections for any trade requiring temporary heat, as deemed necessary by the General Contractor and/or the Architect/Engineer to keep the job moving on schedule until such time that the building is fully enclosed.

B. The Owner will make portable steam unit heaters and campus steam available for use after the building is fully enclosed. The Owner shall have final approval of the fully enclosed status of the building prior to the steam connection. The General Contractor will be required to pick-up and transport the heaters from the Owner's storage area, to install and pay for all piping required for the steam connection and to return the condensate to the Owner and install all electrical connections required to make the unit heater fans functional and thermostat controlled.

C. For purposes of this Specification, the term "fully enclosed" shall mean that the building is weathertight, either by permanent or temporary means.

D. The following temperatures shall be maintained within the building by the General Contractor:

1. 50 Degrees F. minimum during working hours and 35 Degrees F. minimum during non-working hours.

2. For a period of seven (7) days prior to interior finishing (wood, painting, varnishing, resilient tile, acoustical ceilings, etc.) and until final acceptance for occupancy by the Owner, spaces shall be kept 70 degrees to 80 degrees during working hours and 60 degrees minimum at all other times.

E. Permanent new heating systems shall not be used for temporary heat without the written permission of the Architect/Engineer and Owner.

1.07 TEMPORARY TOILETS

A. The Prime Contractor shall provide approved temporary toilet facilities to maintain sanitary conditions. Provide number, type and maintenance of units as required by applicable laws.

1.08 TEMPORARY STORAGE

A. The Prime Contractor and each of their Sub-Contractors shall be responsible for their own temporary storage.

B. There is limited on-site storage space. The Contactors are allowed to park storage trailers on ISU Parking Lot N located on the SW corner of 11th and Chestnut Streets.

C. Provide secure areas as may be required for storage and protection of materials, tools and equipment.

1.09 SIGNS

A. Identification Signs: No signs or advertisements shall be permitted on the project site or on temporary structures, except those which are required to conform to the safety requirements of the Contract Documents or those which are expressly permitted by the Architect/Engineer or specified herein.

1.10 TEMPORARY BARRIERS

A. The Prime Contractor shall be responsible for seeing that all shafts and openings through the floors or roofs are adequately barricaded, marked, and lighted. They shall provide barriers, markers, or other provisions, or all, at all conditions, such as items protruding from the work, which might cause injury to persons. The design, locations, and requirements of protective barricades shall be subject to approval of the Architect/Engineer, but the Contractor shall be responsible for their adequacy. When such conditions no longer exist, barriers and the like shall be removed.

1.11 SITE SECURITY

A. All temporary construction which may be required to maintain security of buildings or construction areas shall be provided by the Prime Contractor. At the end of each day's work, close all windows opened by construction personnel, and close all access doors to work areas. Work damaged in this regard shall be repaired or replaced to the satisfaction of the Architect/Engineer/Owner. Security guard service shall not be provided as a part of any Contract for this project for field office, storage sheds and storage areas, or for protection of construction tools, equipment, and materials. Such security may, at the Contractor's option, be provided at no additional cost to the Owner.

1.12 TRASH REMOVAL

A. The Prime Contractor shall remove from the Construction site, and legally dispose of, all rubbish resulting from the work under his contract. Rubbish shall be removed daily and not be allowed to accumulate, other than the trash placed in trash containers outside the building.

1.13 RESTORATION OF TEMPORARY FACILITIES

A. The Prime Contractor shall be responsible for his restoration of his own temporary facilities.

B. Storage area and project offices: At completion of the work, remove from the project site all evidence of temporary services, field office, temporary sheds, covers, pallets, excess materials, scrap materials, equipment tools, waste, debris, and other foreign materials. Restore to the Architect/Engineer's satisfaction such area to its condition which existed prior to starting construction work, utilizing whatever methods are appropriate. Repair and patch to match all drive and parking lot surfaces damaged by construction processes; subject to the Architect/Engineer's approval. Fill, grade and reseed all lawn areas and replace all trees, plants or shrubs damaged by the construction process.

1.14 TEMPORARY CONSTRUCTION AREA ENCLOSURES/BARRIERS

A. The Prime Contractor shall provide all temporary enclosures/barriers required to secure the construction area from the interconnection tunnel to Gillum Hall

B. The enclosure/barrier shall be constructed in a manner to prevent unauthorized personnel from entering the construction area during non-hours of construction and vice versa.

1.15 TEMPORARY FENCING

A. The Prime Contractor shall provide all temporary fencing required to secure the site.

B. The fencing shall be sectionalized chain link panels at least 6’ in height. The use of plastic snow type fencing or caution tape for site protection is not allowed unless approved by the Owner.

C. Provide feet assemblies to tie the fencing system together and allow for sandbags or other weighs to be placed stabilizing the fencing.

D. Wire ties shall be installed half way up on adjacent panel ends to tie the panels together. It is acceptable to install chain and padlocks at site entrance locations.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 015010

PART 1 – GENERAL

1.01 MATERIALS HANDLING

A. Delivery: Deliver materials and equipment to Project Site in unopened, undamaged dry containers, wrappings, cartons, crates, sacks, or the like, clearly labeled as to product and materials, and with the manufacturer's name or trademark or both. Materials delivered in other than such condition may be rejected by the Architect/Engineer.

B. Storage: Suitably store materials and equipment in designated areas and in accordance with manufacturer's recommendations or in a manner approved by the Architect or both. Store such materials and equipment off the ground, totally protected from ground splash, mud, weather separation, intrusion of foreign materials, and other damage. Do not store materials, equipment, or tools on roofs, unless such materials are to be immediately installed during the current work day, and unless equipment and tools are being integrally used in the work. Do not store volatile materials such as solvents, gasoline, oil, fuels, and the like within the building. Immediately remove paper, rags, etc., which might become soaked with such materials when they must be taken into the building for use in the work. At the end of each work day, remove such "safety cans" of materials to their storage area outside the building. The Contractor shall, upon delivery of material and equipment to the project site, check to ascertain that all materials, parts, accessories, and other incidentals necessary for the installation of such materials and equipment have been delivered and received at the project site, so that no delays are caused in the work due to insufficient quantities of materials or missing parts.

1.02 INSTALLATIONS

A. Materials: Materials and equipment shall be new and undamaged and shall be installed as indicated on the drawings. They shall fit accurately into adjacent work and shall be plumb, level, and true-to-line. All materials and equipment shall be anchored securely and rigidly in place, maintaining alignment with adjacent work. Where installation methods and techniques are not specifically covered by the drawings or the specifications, normal first-class trade practices and manufacturer's instructions and recommendations shall govern, providing that they are approved by the Architect/Engineer.

B. "Not-In-Contract" Items: Materials, equipment, fixtures, devices and other items indicated on the drawings as "Not-In-Contract" or "N.I.C." shall in no way be a part of the Contract. Where such "Not-In-Contract" items are accompanied by an indication to be installed by the Contractor, the Contractor shall receive, store, protect, assemble, install, and connect such items in accordance with the best accepted practices of the trade or trades involved and with the provisions of the Specifications for similar items that are totally part of the Contract. The Contractor shall be responsible for obtaining such specific information for the installation and connection of such items.

C. Reinstalling Existing Items: Where existing materials, equipment, fixtures, devices, and other items are indicated on the drawings to be removed, or received, and reinstalled under the Contract, treat such existing items as if they were new and install such existing items as shown on the drawings, in accordance with the best accepted practices of the trade or trades involved and with provisions of the specifications for similar new items.

1.03 REMOVAL AND RE-INSTALLATION OF EQUIPMENT

A. The Owner is not responsible for the removal or re-installation of equipment necessitated by this work.

B. All electrical disconnects and reconnects of equipment necessitated by this work shall be performed by a licensed bonded Electrical Contractor hired by the Contractor to perform this work. The Owner will assist in locating the power source but will not be responsible for the

actual performance the electrical work.

1.04 ACCESSIBILITY

A. The Contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the contract drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost shall not be made without approval.

B. It is the Contractor's responsibility to provide access panels when serviceable parts of his installation are concealed by finished construction, unless access panels are specifically indicated on the Drawings or elsewhere in the Project Manual to be by others. Access panel data shall be submitted with the equipment Shop Drawings.

C. Ample space shall be allowed for removal of all parts that may require replacement or service in the future. The service area is to be indicated on Shop Drawings.

D. The Contractor shall extend all grease fittings to an accessible location.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 016000

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Survey and field engineering.

B. Quality control.

C. Submittals.

D. Project record documents.

1.02 RELATED SECTIONS

A. Information Available to Bidders: Owner's topographic survey.

B. General Conditions: Basic site engineering requirements.

C. Section 017700 - Contract Closeout: Project Record Documents.

1.03 QUALITY ASSURANCE

A. Employ a Land Surveyor registered in the State of Indiana and acceptable to Architect/Engineer, to perform survey work of this section.

B. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

C. Employ a Professional Engineer of the discipline required for specific service on Project, licensed in the State of Indiana.

1.04 SUBMITTALS FOR REVIEW

A. Submit name, address, and telephone number of Surveyor or Engineer before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit a copy of registered site drawing and a certificate signed by the Land Surveyor or Engineer, that the elevations and locations of the Work are in conformance with Contract

1.05 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

C. Submit Record Documents under provisions of Section 01700.

1.06 EXAMINATION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect/Engineer of any discrepancies discovered.

1.07 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that established by Owner provided survey or as indicated on Drawings.

C. Project survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect/Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.08 SURVEY REQUIREMENTS

A. Provide field engineering services. Utilize recognized engineering survey practices.

B. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.

2. Grid or axis for structures.

3. Building foundation, column locations and ground floor elevations.

D. Periodically verify layouts by same means.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 017000

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work

1.02 RELATED SECTIONS

A. Section 011000 - Summary of Work: Work by Owner or by separate contractors

B. Section 013200 - Submittals and Substitutions

C. Section 016000 - Materials and Equipment

D. Individual Product Specification Sections:

1. Cutting and patching incidental to work of the section
2. Advance notification to other sections of openings required in work of those sections
3. Limitations on cutting structural members

1.03 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of Project
2. Integrity of weather exposed or moisture resistant element
3. Efficiency, maintenance, or safety of any operational element
4. Visual qualities of sight exposed elements
5. Work of Owner or separate contractor

B. Include in request:

1. Identification of Project
2. Location and description of affected Work
3. Necessity for cutting or alteration
4. Description of proposed Work and Products to be used
5. Alternatives to cutting and patching
6. Effect on work of Owner
7. Date and time work will be executed

PART 2 – PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

PART 3 – EXECUTION

3.01 RESPONSIBILITY

A. Each respective Contractor is responsible for the required cutting and patching to complete his work.

B. Each respective Contractor shall coordinate with the General Contractor and bear all costs associated with cutting and patching.

3.02 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.03 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.04 CUTTING

A. Execute cutting and fitting including excavation and fill to complete the Work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Remove samples of installed work for testing when requested.

E. Provide openings in the Work for penetration of mechanical and electrical work.

F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight-exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.05 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. Restore work with new Products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION 017310

017700
CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 SUBSTANTIAL COMPLETION SUBMISSIONS

A. Record Drawings and Record Specifications:

1. The Contractor shall provide the final Field Record Drawings and Specifications which have been maintained and updated during the duration of the Project to the Architect/Engineer for review. Submit documents in electronic PDF~~paper~~ form of each Drawing and Specification Division of the Work.

a. The Contractor markups shall be made with a PDF writer such as Bluebeam or Adobe software. Scans of hand-written edits will not be accepted.

b. The Contractor shall maintain a copy of the PDF as-built Drawings and Specifications throughout the duration of the work.

c. The Contractor shall incorporate via PDF markup all changes to the work, including but not limited to RFIs, ASIs, Change Orders, and field changes.

~~1.~~ d. The Contractor shall provide to the A/E a Revit model from each of the Contractor trades upon execution of a BIM waiver. These Revit files will be used by the A/E to make Record Drawings. See Article 1.03 below and Section 014000 for more information about coordination and quality control.

2. Certifications: The Prime Contractor and Subcontractors shall certify, by endorsement on the Record Drawings and Specifications that each of the revised sheets represents a complete and accurate record of the Work as executed.

B. Operations and Maintenance Data

1. Assemble a manual in electronic PDF format on USB Flash Drive or via download link, indexed by Division of work, presenting for the Owner's guidance full details for care and maintenance of visible surfaces and of equipment included in the Work for review by the A/E.

a. Include a copy of the reviewed Architect/Engineer submittal and/or shop drawing. The Submittal and/or shop drawing shall be annotated by the Contractor indicating that the comments have been included in the document.

b. Include manufacturer's literature relating to motors and other equipment, catalog cut, parts lists, wiring diagrams, instruction sheets, and other pertinent information which will be useful to the Owner in overall operation and maintenance.

c. Include a list of installers and service representatives with company names and addresses, names of individuals to contact, and telephone numbers.

d. Include manuals called for in other Sections of the Specifications, in this manual.

2. Certifications: The Contractor shall certify, by endorsement of the manual, that the manual is complete and accurate.

3. On Projects where the Owner is the Architect/Engineer, submit to the Owner for review.

C. Warranties

1. Forms:

a. Extended Warranties: Provide a copy of the manufacturer's extended warranty, fill it out completely, sign it, and have it countersigned by the installer and manufacturer if required by the Contract Documents.

b. Manufacturers' Warranties: Manufacturer's warranty modified, when required to comply with requirements of the Contract Documents.

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2. Starting Date: The starting date for warranties is the Date of Substantial Completion of the Work.
3. Submittal: At the time of Substantial Completion submit all warranties, including special warranties, required by the Contract Documents to the Architect/Engineer review.

D. Statement of Application

1. Submit fully executed AIA Document G704, Certificate of Substantial Completion.

E. Service and Maintenance Contracts

1. At the time of Substantial Completion submit executed contracts for extended service or maintenance required by the Contract Documents to the Architect/Engineer for review by the A/E.
2. Extended maintenance proposals where called for in the specification shall be submitted with the proposals for each trade at the time their portion of the work is bid. Furnish copies of the maintenance proposal to the Owner and Architect/Engineer for review prior to award of the subcontract for each portion of work.

1.02 FINAL CLEANING

A. Responsibility: The Prime Contractor is responsible for the final cleaning of the Project and for the coordination and direction of cleaning by all trades.

B. Materials:

1. Use only cleaning materials recommended by the manufacturers of the surfaces to be cleaned.
2. Use cleaning materials only on surfaces recommended by the cleaning materials manufacturers.

C. Execution:

1. Employ experienced workers, or professional cleaners, for final cleaning.
2. Clean all surfaces whether exposed to view or not.
3. Remove trash, rubbish, waste materials, tools, and equipment from the site.
4. Remove grease, dust, dirt, plaster, mortar, fingerprints, and other foreign materials from interior and exterior surfaces exposed to view, e.g., the surfaces of structural steel, miscellaneous metal, woodwork, plaster, masonry, concrete, mechanical and electrical equipment, piping, duct work, and conduit; polish surfaces so designated to shine finish.
5. Clean the electrical closets, pipe and duct shafts, chases, furred spaces, and similar spaces which are generally unfinished. Leave these spaces free from rubbish, loose plaster, mortar droppings, waste construction materials, dirt, and dust.
6. The Architect/Engineer is to review items which the Prime Contractor proposes removing labels before they are removed.
7. Maintain cleaning until date of Substantial Completion or the date of partial occupancy of the building, whichever is earlier. Re-cleaning will not be required after the Work has been inspected and accepted, unless later operations of the Contractor make re-cleaning of certain portions necessary.

1.03 PREPARATION OF FINAL RECORD DRAWINGS AND RECORD SPECIFICATIONS

A. The Prime Contractor shall employ the Project A/E to re-draft, in Revit~~CAD~~ format, the PDF~~paper~~ copy Record Drawings onto the Bid Drawings to create the final Record Drawings.

B. The Prime Contractor shall employ the Project A/E to retype the PDF~~paper~~ Record Specifications to indicate all revisions to the Bid Specifications. Items changed shall be marked by a double strike through and revised language inserted in red letters.

C. An Allowance to cover the costs of the re-drafting of Drawings and revisions to the Specification will be provided and shall be included in the Prime Contractors Bid. Final Allowance cost payments will be based on actual documented A/E costs for their work. The Allowance payment will be adjusted accordingly. This Allowance shall be listed as a separate line item on the Schedule of Values.

1.04 FINAL CLOSEOUT

A. Final Closeout date shall be as listed in Section 001010 1.01

B. At Final Closeout the Contractor shall submit to the Owner, via the Architect/Engineer if applicable:

1. One (1) PDF~~hard~~ copy of the reviewed and accepted O&M Manual~~. in 3-ring binder(s)~~
2. One (1) copy on a USB Flash Drive of the complete Project Documentation in PDF format, except as noted in item “o” below, including but not limited to:
   a. Design Meeting Notes (the Contractor shall coordinate with the A/E to obtain)
   b. Pre-Bid meeting documents
   c. The Contractor’s Project Bidding Documents including Addenda.
   d. Award documentation
   e. Required submissions as detailed in the Award Letter
   f. Pre-Construction meeting documents and
   g. Progress meeting notes and Construction observation notes.
   h. All Change items, e.g. ASI, RFI, RFQ, CP, CO, etc., with documentation
   i. Pay Applications
   j. Reviewed and accepted O&M Manual,
   k. Warranties,
   l. Extended Service and Maintenance Contracts
   m. Record Specifications
   n. A PDF~~scanned~~ copy of the marked-up Record Drawings
   o. Record Drawings in both PDF and CAD/Revit format
3. The Prime Contractor shall retain the paper copies and PDF copies of the Record Drawings and Record Specifications for a minimum of seven (7) years in a safe location and produce these documents upon request by the Owner.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 017700

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SECTION 024114 – SELECTIVE DEMOLITION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Removal of designated building equipment and fixtures.

B. Removal of designated construction.

C. Disposal or storage of removed materials.

D. Identification of utilities.

E. Refer to items as indicated.

1.02 SUBMITTALS FOR CLOSEOUT

A. Project Record Documents: Accurately record actual locations of capped utilities and subsurface obstructions.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, safety of structure, dust control, products requiring electrical disconnection and re-connection.

B. Obtain required permits from authorities.

C. Do not close or obstruct egress width to any building or site exit.

D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

E. Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.04 SCHEDULING

A. Perform work between the hours of 7 a.m. and 4 p.m.

1.05 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer and Owner. Do not resume operations until directed.

C. Maintain protected egress and access to the Work.

PART 2 – NOT USED

PART 3 – EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain temporary insulated partitions at required locations.

B. Erect and maintain weatherproof closures for exterior openings.

C. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy.

D. Protect existing materials which are not to be demolished.

E. Prevent movement of structure; provide bracing and shoring.

F. Notify affected utility companies before starting work and comply with their requirements.

G. Mark location and termination of utilities.

H. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

A. Disconnect, remove, cap, and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members.

C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

D. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

E. Remove temporary Work.

3.03 PROTECTION OF SALVAGED ITEMS

A. Remove, store and protect the materials and equipment scheduled to be re-used.

END OF SECTION 024114

SECTION 02 41 00 – DEMOLITION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1.01.A.1 Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required for demolition, removal, and disposal Work.

1.01.A.2 The Work under this Section includes, but is not necessarily limited to:

1.01.A.2.1 Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, walls, structural steel, metals, attachments, appurtenances, piping, electrical and mechanical systems and equipment, sidewalks, and similar existing facilities.

1.01.A.2.2 Demolition and removal of all Underground Facilities underneath, and above-grade piping and utilities in, structures shown or indicated for demolition, unless the Underground Facilities or above-grade facilities are shown or indicated as to remain.

1.01.A.2.3 Remove from slabs, walls, and footings that are to be demolished all utilities and appurtenances embedded in such construction.

1.01.A.3 Demolitions and removals specified under other Sections shall comply with requirements of this Section.

1.01.A.4 Perform demolition Work within areas shown or indicated.

1.01.A.5 Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition.

B. Coordination:

1.01.B.1 Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owner's operation and adjoining spaces.

1.01.B.2 Coordinate with the Owner any building service interruptions.

1.01.B.2.1 Do not disable or disrupt building fire or life safety systems without three (3) calendar days prior written notice to Owner.

1.01.B.2.2 Schedule tie-ins to existing systems to minimize disruption.

1.01.B.2.3 Coordinate work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas

1.01.B.3 Review procedures under this and other Sections and coordinate the Work that will be performed with or before demolition and removals.

1.01.B.4 Notify other contractors in advance of demolition and removals Work to provide other contractors with sufficient time for performing work and coordinating items included in their contracts that will be performed before or in conjunction with demolition and removals Work.

1.02 QUALITY ASSURANCE

A. Qualifications:

1.02.A.1 Electrical Removals: Entity and personnel performing electrical removals shall be electrician legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located

B. Regulatory Requirements:

1.02.B.1 Demolition, removal, and disposal Work shall be in accordance with all applicable laws and regulations.

1.02.B.2 Comply with requirements of authorities having jurisdiction.

1.02.B.3 Obtain any required permits from authorities having jurisdiction.

1.03 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

1.04 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas.

B. Cease operations immediately if structure appears to be in danger and notify Engineer. Do not resume operations until directed.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.01 PREPARATION

A. Notification:

3.01.A.1 At least 48 hours prior to commencing demolition or removal, notify Engineer in writing of planned start of demolition Work. Do not start removals without permission of Engineer.

3.01.A.1.1 Protection of Surrounding Areas and Facilities:

3.01.A.1.2 Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties.

3.01.A.1.3 Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.

3.01.A.1.4 Provide temporary barriers, lighting, sidewalk sheds, and other necessary protection.

3.01.A.1.5 Repair damage to facilities that are to remain.

B. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, do the following:

3.01.B.1 Should uncharted or incorrectly charted Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.

3.01.B.2 Sanitary Sewer: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.

3.01.B.3 Storm Water: Existing storm water system shall remain in place until demolitions of existing building or structure is completed. Upon completing demolition, cut and cap storm sewer laterals at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities.

3.01.B.4 Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.

3.01.B.5 Shutdown of utility services shall be coordinated by Contractor, assisted by OWNER as required relative to contacting utility owners.

3.02 SALVAGE REQUIREMENTS

A. Coordinate with Owner to identify equipment required to be removed and delivered to Owner. The Owner reserves the right to claim any materials for salvage, including:

3.02.A.1 Drives, panels, motors, starters, removed wire, and other miscellaneous electrical components.

3.02.A.2 Valves, piping, and other process equipment.

3.02.A.3 Pumps and meters.

B. Tag components and equipment Owner designates for salvage. Identification tags shall remain intact on all removed equipment and identify the date and location from which the salvaged item was removed.

C. Protect designated salvage items from demolition operations until items can be removed.

D. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect in accordance with requirements of Section 01 60 00.

E. Carefully remove building components and equipment indicated to be salvaged.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each salvaged item.

3.03 DEMOLITION – GENERAL

A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.

B. Conduct demolition to minimize interference with adjacent building areas.

C. Maintain protected egress from and access to adjacent existing buildings at all times.

D. Do not close or obstruct roadways or sidewalks without Owner approval.

E. Pollution Controls:

3.03.E.1 Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level.

3.03.E.2 Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.

3.03.E.3 Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions.

F. Structure Demolition:

3.03.F.1 Unless otherwise approved by Engineer, proceed with demolition from top of structure. Complete demolition Work above each floor or tier before disturbing supporting members of lower levels.

3.03.F.2 Demolish concrete and masonry in small sections.

3.03.F.3 Remove structural framing members and lower to ground using hoists, cranes, or other suitable methods. Do not throw or drop to the ground.

3.03.F.4 Cease operations immediately if structure appears to be in danger and notify Engineer.

G. Demolition of Site Improvements:

3.03.G.1 Pavement, Sidewalks, Curbs, and Gutters: Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.

3.03.G.2 Manholes, Vaults, Chambers, and Handholes: Remove to the limits shown or indicated on the Drawings.

3.03.G.3 Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes: Remove to the extent shown or indicated on the Drawings. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the “Mechanical Removals” Article in this Section.

H. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.04 STRUCTURAL REMOVALS

A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor’s expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to OWNER.

B. Recycling and Reuse of Demolition Materials:

3.04.B.1 All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in or upon building or structure to be demolished shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.

3.04.B.2 Do not use demolished materials as fill or backfill adjacent to structures, in pipeline trenches, or as subbase under structures or pavement.

C. All concrete, brick, title, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items from Building 55 shall be saved for re-use.

D. After removing concrete and masonry walls or portions thereof, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.

E. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.

3.04.E.1 Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended.

3.04.E.2 Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.

3.04.E.3 Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair the resulting hole, with repair mortar for concrete and grout for masonry, to be flush with the surface.

3.04.E.4 Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.

F. Where equipment or material anchored to concrete or masonry are removed and anchors are not to be re-used, remove the anchors to not less than 1.5 inches beneath surface of concrete or masonry member. Repair the resulting hole, using repair mortar for concrete and grout for masonry, to be flush with the surface. Alternately, when the anchor is stainless steel, the anchor may be cut flush with the surface of the concrete or masonry, when so approved by Engineer.

G. Jambs, sills and heads of windows, passageways, doors, or other openings (as applicable) cut-in to the Work or to existing construction shall be dressed with masonry, concrete, or metal to provide smooth, finished appearance.

H. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Section, unless specified elsewhere in the Contract Documents.

3.05 MECHANICAL REMOVALS

A. Mechanical demolition and removal Work includes dismantling and removing existing piping, ductwork, pumps, equipment, tanks, and appurtenances as shown, indicated, and required for completion of the Work. Mechanical removals include cutting and capping as required.

B. Demolition and Removals of Piping and Similar Items:

3.05.B.1 Purge piping of chemicals or fuel (as applicable) and make safe for removal and capping. Remove to the extent shown or indicated existing process, water, waste and vent, chemical, gas, fuel, and other piping. Remove piping to the nearest solid piping support and provide caps on ends of remaining piping. Where piping to be demolished passes through existing walls to remain, cut off and cap pipe on each side of the wall.

3.05.B.2 Caps, Closures, Blind Flanges, and Plugs:

3.05.B.2.1 Provide closure pieces, such as blind flanges and caps, where shown or required to complete the Work.

3.05.B.2.2 Where used in this Section, the term “cap” means the appropriate type closure for the piping or ductwork being closed, including caps, blind flanges, and other closures.

3.05.B.2.3 Caps shall be compatible with the piping or ductwork to which the cap is attached, fluid- tight and gastight, and appropriate for the fluid or gas conveyed in the pipe or duct.

3.05.B.2.4 Unless otherwise shown or indicated, caps shall be mechanically fastened, fused, or welded to pipe or duct. Plug piping with means other than specified in this Section as shown on the Drawings.

3.05.B.3 When Underground Facilities are altered or removed, properly cut and cap piping left in place, unless otherwise shown or indicated.

3.05.B.4 Remove waste and vent piping, and ductwork to extent shown and cap as required. Where demolished vent piping, stacks, and ductwork passes through existing roofing, patch the roof with the same or similar materials. Completed patch shall be watertight and comply with roofing manufacturer's recommendations.

3.05.B.5 Modifications to potable water piping and other plumbing and heating system work shall comply with Laws and Regulations. All portions of potable water system that have been modified or opened shall be hydrostatically tested and disinfected in accordance with the Contract Documents, and Laws and Regulations. Hydrostatically test other, normally- pressurized, plumbing piping and heating piping.

C. Equipment Demolition and Removals:

3.05.C.1 To the extent shown or indicated, remove existing process equipment; pumps; storage tanks; hoisting and conveying equipment; heating, ventilating, and air conditioning equipment; generators; and other equipment.

3.05.C.2 Where required, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as required for access through and egress from building or structure. Disassembly shall comply with Laws and Regulations. Provide required means to remove equipment from building or structure.

3.05.C.3 Remove control panels, operator stations, and instruments associated with equipment being removed, unless shown or indicated otherwise.

3.05.C.4 Remove equipment supports as applicable, anchorages, base, grout, and piping. Remove anchorage systems in accordance with the "Structural Removals" Article in this Section. Remove small-diameter piping back to header unless otherwise indicated.

3.05.C.5 Remove access platforms, ladders, and stairs related to equipment being removed, unless otherwise shown or indicated.

3.06 ELECTRICAL REMOVALS

A. Electrical demolition Work includes removing existing transformers, distribution switchboards, control panels, motors, starters, conduit and raceways, cabling, poles and overhead cabling, panelboards, lighting fixtures, switches, and miscellaneous electrical equipment, as shown, specified, or required.

B. Remove existing electrical equipment and fixtures to avoid damaging systems to remain, to keep existing systems in operation, and to maintain integrity of grounding systems.

C. Remove or modify motor control centers and switchgear as shown or indicated. Modified openings shall be cut square and dressed smooth to dimensions required for installation of equipment.

D. Disconnect and remove motors, control panels, and other electrical gear where shown or indicated. Motors, microprocessors and electronics, other electrical gear to be reused shall be

stored by the Owner.

E. Cables in conduits to be removed shall be removed back to the power source or control panel, unless otherwise shown or indicated. Verify the function of each cable before disconnecting and removing.

F. Conduits, raceways, and cabling shall be removed where shown or indicated. Abandoned conduits concealed in floor, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to Engineer. Exposed conduits, junction boxes, other electrical appurtenances, and their supports shall be disassembled and removed. Repair all areas of the Work to prevent rusting on exposed surfaces.

G. Conduits in Underground Facilities not scheduled for reuse shall be suitably capped watertight where each enters building or structure to remain.

H. Where shown or indicated, remove direct burial cable. Openings in buildings for entrance of direct burial cable shall be patched with repair mortar or other material approved by Engineer for this purpose and made watertight.

I. Existing poles and overhead cables shall be removed or abandoned as shown and specified. Existing substation(s) and poles owned by electric utility will be removed by the electric utility. Completely remove from the Site poles not owned by electric utility and shown or indicated for removal. Make necessary arrangements with electric utility for removal of utility company's transformers and metering equipment after new electrical system has been installed and energized.

J. Lighting fixtures, wall switches, receptacles, starters, and other miscellaneous electrical equipment, not designated as remaining as OWNER's property, shall be removed and properly disposed off-Site as required.

3.07 DISPOSAL OF DEMOLITION DEBRIS

A. Remove from the Site all debris, waste, rubbish, and material resulting from demolition operations and equipment used in demolition Work. Remove materials as work progresses. Upon completion of work, leave areas in clean condition. Comply with the General Conditions and Supplementary Conditions.

B. Transportation and Disposal:

3.07.B.1 Non-hazardous Material: Properly transport and dispose of non-hazardous demolition debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Asbestos, PCBs, Petroleum, Hazardous Waste, Radioactive Material, or other material designated as hazardous in Laws and Regulations.

3.07.B.2 Hazardous Material: When handling and disposal of hazardous materials is included in the Work, properly transport and dispose of hazardous materials in accordance with the Contract Documents and Laws and Regulations.

C. Submit to Engineer information required in this Section on proposed facility(ies) where demolition material will be recycled. Upon request, Engineer or OWNER, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and OWNER.

END OF SECTION

SECTION 03 01 30 – REPAIR AND REHABILITATION OF CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to repair or rehabilitate, as required, all existing concrete shown or indicated in the Contract Documents as being repaired or rehabilitated.
2. Contractor shall repair all damage to new concrete construction as specified in this Section except for repair Work specified in Section 03 30 00 - Cast-In-Place Concrete.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the Work that must be installed with or before repair and rehabilitation of concrete.

C. Related Sections:

1. Section 03 15 00 - Concrete Accessories.
2. Section 03 30 00 - Cast-In-Place Concrete.
3. Section 03 60 00 - Grouting.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Crack Repair:

1. Basis of Measurement: By the linear foot.
2. Basis of Payment: Includes surface preparation, injection ports, repair materials, and surface finishing. Unit price for payment of “Crack Repair” shall be as shown on the completed Bid Form. Crack Repair shall include structural crack repair and non-structural crack repair. The unit price shall be the same for both systems.

1.03 REFERENCES

A. Standards referenced in this Section are:

1. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
2. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
3. ASTM C1042 - Standard Test Method for Bond Strength of Latex Systems Used With Concrete By Slant Shear.
4. ASTM D1042, Test Method for Linear Dimensional Changes of Plastics Under Accelerated Service Conditions.
5. ASTM D3574, Test Methods for Flexible Cellular Materials – Slab, Bonded, and Molded Urethane Foams.
6. ASTM G109, Test Method for Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments.

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Submit the following:

1. Product Data: Information on all products proposed for use, including manufacturer's brochures, technical data, specifications, and other applicable data.

2. Manufacturer's Instructions: Manufacturer's recommended procedures for installing materials proposed for use.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Conform to Section 01 60 00, Product Requirements, and this Section.

B. Clearly mark on containers manufacturer's name and label, name or title of material, manufacturer's stock number, and date of manufacture.

C. Handle materials carefully to prevent inclusion of foreign matter.

D. Do not open containers or mix components until necessary preparatory Work has been completed and application Work is to start immediately.

E. Store only approved materials at the site.

PART 2 – PRODUCTS

2.01 REPAIR MORTAR

A. Product Description: Repair mortar shall be prepackaged, cement-based product specifically formulated for repairing concrete surface defects.

B. Products and Manufacturers: Provide one of the following:

1. SikaTop 122 Plus or SikaTop 123 Plus, by Sika Corporation.

2. DuralTop Gel, DuralTop Flowable Mortar by Euclid Chemical Company.

3. Or equal.

C. Materials:

1. Provide a two-component, polymer-modified, Portland cement, fast-setting, trowel-grade mortar. Repair mortar shall be enhanced with penetrating corrosion inhibitor, and shall have the following properties:

Physical Property	Value	ASTM Standard
Minimum Compressive Strength at One Day	2,000 psi	C109
Minimum Compressive Strength at 28 Days	6,000 psi	C109
Minimum Bond Strength at 28 Days	1,800 psi	C882*

* Modified for use with repair mortars.

2. Where the least dimension of the placement in width or thickness exceeds four inches, extend repair mortar by adding aggregate as recommended by repair mortar manufacturer.

2.02 REPAIR OF EXPOSED REINFORCING STEEL

A. System Description: System for repair of exposed reinforcing steel shall consist of two components: an initial application of corrosion inhibitor and subsequent application of protective

slurry mortar.

B. Corrosion Inhibitor:

1. Corrosion inhibitor shall penetrate the hardened concrete surface and form a protective layer on reinforcing steel.
2. Products and Manufacturers: Provide one of the following:
   a. Sika FerroGard 903, by Sika Corporation.
   b. Or equal.
3. Corrosion inhibitor shall:
   a. Not change the substrate's color, appearance, or texture.
   b. Penetrate independently of orientation (horizontal, vertical, overhead) at rate up to 1/10 to 4/5 inches per day, depending on density of concrete, measured using secondary neutron mass spectroscopy.
   c. Form on reinforcing steel a protective layer of high integrity of at least 100 angstroms thickness, measured using x-ray photon spectroscopy and secondary ion mass spectroscopy.
   d. Demonstrate reduction in corrosion currents after treatment as determined using cracked beam corrosion tests of concrete, as adapted from ASTM G109.
   e. Be capable of reducing active corrosion rates by at least 65 percent. Reduction shall be demonstrated by project references and an independent corrosion engineer using linear polarization resistance.
   f. Penetrate up to three inches in 28 days, measured using secondary neutron mass spectroscopy.

C. Protective Slurry Mortar:

1. Material shall be two-component, polymer-modified, cementious waterproofing and protective slurry mortar. Provide two coats at coverage of 50 square feet per gallon per coat.
2. Products and Manufacturers: Provide one of the following:
   a. Sikatop Seal 107, by Sika Corporation.
   b. Or equal.

2.03 CRACK INJECTION MATERIALS

A. Structural Crack Repair System:

1. Epoxy for injection shall be low-viscosity, high-modulus moisture insensitive type.
2. Products and Manufacturers: Provide one of the following:
   a. Sikadur 55 SLV or Sikadur 52 and Sikadur 31, Hi-Mod Gel, by Sika Corporation.
   b. Dural 335 by Euclid Chemical Company .
   c. Or equal.

B. Non-structural Crack Repair System:

1. Hydrophobic Polyurethane Chemical Grout:
   a. Provide hydrophobic polyurethane that forms a flexible gasket.

b. Products and Manufacturers: Provide one of the following:

1) SikaFix HH LV, by Sika Chemical Company.

2) Hydro Active Flex SLV, by De Neef Construction Chemicals, Inc.

3) Or equal.

c. Shrinkage limit shall not exceed 4.0 percent in accordance with ASTM D1042.

d. Minimum elongation of 250 percent in accordance with ASTM D3574.

e. Minimum tensile strength of 150 psi in accordance with ASTM D3574.

f. Product shall be listed in NSF/ANSI 61.

2. Hydrophilic Acrylate-Ester Resin:

a. Hydrophilic crack repair system shall be acrylate-ester resin that forms a flexible gasket and increase in volume by at least 50 percent when in contact with water.

b. Products and Manufacturers: Provide one of the following:

1) Gelacryl Superflex AR manufactured by DeNeef Corporation.

2) AR870 manufactured by Prime Resins, Inc.

3) Or equal.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which the repair Work is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Sound concrete surfaces to be repaired by tapping with hammers, dragging chains or other suitable method to locate delaminations. Mark areas where delaminations are located and review with Engineer prior to removing delaminated concrete.

C. Verify surfaces are ready to receive work. Engineer shall be contacted to verify quantity of repair prior to place of surface repairs, full depth repairs, expansion joint repairs and crack injection.

3.02 PREPARATION

A. Surface Preparation:

1. Initial Surface Preparation: Remove by chipping, abrasive blasting, or hydro blasting all laitance, foreign material, and unsound concrete from entire area to be repaired. Further roughen surface as specified in this Section. Where non-shrink grout or repair mortar is used, perform additional surface preparation, if any, recommended by product manufacturer.

2. Wetting Procedure: Where repair concrete, shotcrete, or cement grout is used, and bonding agent is not required, or where repair mortar or non-shrink grout manufacturer recommends wet or saturated surface, perform the following:

a. Continuously apply water for at least four hours to surface being repaired. Where large surface areas are to be repaired, use fog-spray nozzles, mounted on stands, in sufficient number so that entire surface to be repaired is contacted by fog spray cloud.

b. Prevent concrete from drying until after repair is completed. Re-wet surfaces not yet repaired using water sprays at least a daily; should more than four days elapse without re- wetting surfaces not yet repaired, repeat the original saturating procedure.

c. Remove standing water in areas to be repaired before placing repair material. Provide means to remove excess water from structure.

3. Preparation for Epoxy Bonding Agent: Where repair material manufacturer recommends use of epoxy-bonding agent, conform to recommendations of both repair material manufacturer and bonding agent manufacturer.

3.03 INSTALLATION, GENERAL

A. Construction Tolerances: Shall be as specified in Section 03 30 00, Cast-In-Place Concrete, except as specified in this Section and elsewhere in the Contract Documents.

B. Care shall be taken to fully consolidate repair material, completely filling all portions of space to be filled.

C. Bring surface being repaired into alignment with adjacent surfaces, providing uniform, even surface. Surface repaired shall match adjacent existing surfaces in texture and shall receive coatings or surface treatments, if any, provided for the existing surface adjacent to repaired surface.

D. Curing:

1. Curing of repair mortar and non-shrink grout shall be in accordance with manufacturer's recommendations, except that minimum cure period shall be three days.

2. Curing of other materials shall be in accordance with requirements of Section 03 30 00, Cast- In-Place Concrete.

3.04 REPAIR OF SURFACE DEFECTS

A. Surface defects are depressions in a concrete surface that do not extend all the way through the concrete. Surface defects can result from removal of an embedded item, removal of an intersecting concrete member, physical damage, or unrepaired rock pockets created during original placement. For spalls that result from corroded reinforcing steel or other embedment refer to Article 3.7 of this Section.

B. Preparation: Perform the following in addition to requirements of Article 3.2 of this Section

1. Remove by chipping all loose, damaged concrete to sound material.

2. Where existing reinforcing is exposed, remove concrete to minimum of one-inch around exposed bars. If existing bars are cut through, cracked, or cross sectional area is reduced by more than 25 percent from original, immediately notify Engineer.

3. Score-cut perimeter of area to be repaired to minimum depth of 1/2-inch and maximum depth that will not cut existing reinforcing steel. Chip out existing concrete to the score line so that minimum thickness of repair mortar will be 1/2-inch.

C. Repair Material:

1. Completely fill the surface defect with specified repair material, in accordance with material manufacturer's instructions and the Contract Documents.

2. Perform, with repair mortar, repairs of surface defects in concrete normally in contact with water or soil, and interior surfaces of structures that contain water.

3. Repair of other surface defects may be by applying repair mortar, repair concrete, shotcrete, or cement grout, as appropriate.

3.05 PATCHING OF HOLES IN CONCRETE

A. For holes larger than 16-inch diameter or equivalent area of hole, refer to the Drawings for reinforcing details.

B. Fill openings less than four inches in their least dimension with Class III non-shrink epoxy grout in accordance with Section 03 60 00 - Grouting.

C. Openings greater than four inches and less than 16 inches in their least dimension shall be coated with an epoxy bonding agent prior to filling with Class I non-shrink grout in accordance with Section 03 60 00 - Grouting.

D. Openings greater than 16 inches in their least dimension shall be coated with an epoxy bonding agent prior to filling with Class A concrete in accordance with Section 03 30 00- Cast-In-Place Concrete.

E. Where repaired holes are in contact with water or soil, provide hydrophilic rubber waterstop within the opening in accordance with Section 03 15 00 - Concrete Accessories, prior to filling with repair material.

3.06 REPAIR OF LINED HOLES

A. This Article applies to openings with embedded material over all or a portion of inside surface of hole. Where indicated on the Drawings, remove embedded materials and repair the hole in accordance with Article 3.5 of this Section, as modified in this Article 3.6.

B. Where embedded material is allowed to remain, remove embedded material to at least two inches into the hole, as measured from the plane surface of concrete wall or slab, as applicable. Embedded material left in place shall be roughened or abraded for proper bonding to repair material. Completely remove substances that interfere with proper bonding.

C. Completely remove embedded items not securely and permanently anchored into concrete.

D. Completely remove embedded items larger than 12 inches in their smallest dimension. In lieu of removing the embedded item, where reinforcing is required as shown or indicated in the Contract Documents, weld reinforcing to embedded item to remain, provided embedded item to remain is composed of metal to which reinforcing steel can be welded.

3.07 REPAIR OF DETERIORATED CONCRETE

A. This Article pertains to deteriorated concrete which has been damaged due to corrosion of reinforcing steel, physical damage due to abrasion, or damage due to chemical attack. Use repair mortar, as specified in this Article, for repairing deteriorated concrete. Where repaired surface will be subsequently covered with plastic liner material, coordinate finishing with requirements for installing plastic liner material.

B. Surface Preparation: In addition to requirements of Article 3.2 of this Section, perform the following surface preparation:

1. Remove loose, broken, softened, and acid-contaminated concrete by abrasive blasting and chipping to sound, uncontaminated concrete.

2. Upon completion of removal of deteriorated concrete, notify Engineer in writing. Allow two weeks for Engineer to evaluate the surface, perform testing for acid contamination if required, determine if additional concrete shall be removed, and to develop special repair details (if any) required. Should Engineer determine that additional concrete be removed to reach sound, uncontaminated concrete, allow another two-week period for further evaluation and testing following the additional removal.

3. Surface preparation shall conform to recommendations of repair mortar manufacturer.

4. Repair and rehabilitate isolated areas of exposed reinforcing bars in accordance with Article

3.4 of this Section. If extensive areas of reinforcing steel are uncovered after removal of deteriorated concrete, Engineer will determine the repair methods required.

C. Repair Mortar Placing:

1. Conform to manufacturer's recommended procedures for mixing and placing repair mortar.
2. After initial mixing of repair mortar, addition of water is not allowed.
3. Minimum Thickness:
   a. Install repair mortar to not less than minimum thickness recommended by manufacturer, and not less than 1/2-inch.
   b. Where removal of deteriorated concrete results in repair thickness of less than minimum required thickness to return to original concrete surface in isolated areas totaling less than ten percent of total repair surface area, remove additional concrete to obtain at least the required minimum thickness.
   c. Where surface area with repair thickness less than minimum required thickness exceeds ten percent of total repair area, notify Engineer.
   d. Provide repair mortar so that minimum cover over existing reinforcing steel is two inches. Do not place repair mortar creating locally raised areas.
   e. Where transitioning to or from wall surfaces not requiring repair, do not feather-out repair mortar at transition. Instead, form the transition by saw cutting a score line to not less than minimum required repair mortar depth and chip out concrete to the saw cut line. Do not cut or otherwise damage reinforcing steel.
4. Place repair mortar to an even, uniform plane to restore concrete member to its original surface. Out-of-plane tolerance shall be such that the gap between 12-inch long straight edge and repair mortar surface does not exceed 1/8-inch, and gap between a four-foot long straight edge and repair mortar surface shall not exceed 1/4-inch. Tolerances specified in this paragraph apply to straight edges placed in any orientation at any location.

D. Finishing:

1. Provide smooth, steel trowel finish to repair mortar.
2. When completed, there shall be no sharp edges. Provide exterior corners, such as at penetrations, one-inch radius. Interior corners shall be square, except corners to receive plastic lining which shall be made with two-inch fillet in repair mortar.

3.08 REPAIR OF EXPOSED REINFORCING

A. Remove, by abrasive blasting or hydro blasting, all corrosion, foreign materials, and unsound concrete from area to be repaired.

B. Surface shall be visually dry before applying corrosion inhibitor. Liberally apply corrosion inhibitor to achieve coverage of 100 square feet per gallon in two or more coats, by allowing corrosion inhibitor to soak into substrate. Time between coats shall be the longer of: one hour, or as recommended by corrosion inhibitor manufacturer. Apply using rollers, brushes, or hand-pressure spray equipment.

C. After applying final coat of corrosion inhibitor, minimum cure time of 24 hours is required.

D. Provide high-pressure wash to surfaces to be repaired to remove filmy residue from corrosion inhibitor.

E. For mortar coating, conform to Paragraphs 3.7.C, 3.7.D, 3.7.E of this Section.

3.09 CRACK INJECTION

A. Examine areas under which injection Work will be installed and locate cracks that require injection. Identify and inject cracks greater than 0.010-inch wide in structures that retain or contain water, wastewater, or similar liquid.

B. Install injection material in accordance with crack injection manufacturer's requirements.

C. After injecting and curing, verify that injected material penetrated the crack adequately and that there is no visible leakage through the crack. After injecting, if crack continues to leak, re-inject crack at no additional cost to Owner until structure is watertight.

D. If proper penetration of crack cannot be achieved, submit to Engineer a proposed alternate approach for modifying the specified injection procedure to properly seal the crack. In new concrete and in concrete cracked as a result of Contractor's operations, perform modifications to crack injection procedure and fully repair the crack without additional cost to Owner or extension of the Contract Times.

3.10 SITE QUALITY CONTROL

A. Owner will employ and pay for services of testing laboratory for Site quality control testing. Engineer will direct the number of tests and specimens required, including providing necessary materials for making and facility for storing test specimens. Contractor shall make standard compression test specimens as specified in this Section under the observation of Engineer. Contractor shall provide:

1. Necessary assistance required by Engineer.
2. All labor, material, and equipment required, including rods, molds, thermometer, curing in heated storage box, and all other incidentals required, subject to approval by Engineer.
3. All necessary storage, curing, and transportation required for testing.
4. Contractor will be charged for cost of additional testing and investigation, if any, for Work performed that is not in accordance with the Contract Documents or is otherwise defective.

B. Site Tests of Cement-based Grouts and Repair Mortar:

1. Obtain compression test specimens during construction from first placement of each type of mortar or grout, and at intervals thereafter as selected by Engineer, to verify compliance with the Contract Documents. Specimens will be made by Engineer or Engineer's representative.
2. Compression tests and fabrication of specimens for repair mortar and non-shrink grout will be performed in accordance with ASTM C109. Set of three specimens will be made for each test. Tests will be made at seven days, 28 days, and additional time periods as deemed appropriate by Engineer.
3. Material, already placed, failing to conform to the Contract Documents, is defective.

C. Repair Concrete: Repair concrete shall be tested as required in Section 03 30 00- Cast-In-Place Concrete.

END OF SECTION

SECTION 03 11 00 – CONCRETE FORMING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete forming. The Work also includes:
    a. Designing forming systems in accordance with requirements of ACI 347 and the Contract Documents.
    b. Providing forming to accommodate the Work under this and other Sections and building into forming items such as sleeves, anchorage devices, inserts, pipe embedments, reinforcing, and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.
2. All exposed, exterior concrete Work shall be classified as architectural finished concrete.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before concrete forming Work.
2. Coordinate forming Specifications with requirements for finished surfaces specified in Section 03 30 00 - Cast-In-Place Concrete.

C. Related Sections:

1. Section 03 15 00 - Concrete Accessories.
2. Section 03 30 00 - Cast-In-Place Concrete.
3. Section 03 11 16 – Architectural Form Liners.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 117, Specifications for Tolerances for Concrete Construction and Materials and Commentary.
2. ACI 301, Specifications for Structural Concrete.
3. ACI 303R, Guide to Cast-in-Place Architectural Concrete Practice.
4. ACI 347, Guide to Formwork for Concrete.
5. ACI SP-4, Formwork for Concrete.
6. ASTM C805/C805M, Test Method for Rebound Number of Hardened Concrete.
7. ASTM C1074, Practice for Estimating Concrete Strength by the Maturity Method.
8. NIST PS 1, Structural Plywood.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Professional Engineer:

a. Contractor or formwork Supplier shall retain a registered professional engineer legally qualified to practice in same state as the Site. Professional engineer shall have at least five years' experience designing formwork and falsework of the type required.

b. Responsibilities include:

1) Reviewing formwork and falsework performance and design criteria stated in the Contract Documents.

2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to Engineer by Contractor.

3) Preparing or supervising preparation of design calculations verifying compliance of formwork and falsework with requirements of the Contract Documents.

4) Signing and sealing all calculations.

5) Certifying that:

a) Design of formwork and falsework was performed in accordance with performance and design criteria stated in the Contract Documents, and Design conforms to all Laws and Regulations, and to prevailing standards of practice.

b) In place falsework, prior to concrete placement, complies with the intent of the forming design and complies with the Contract Documents.

B. Mock-Ups for Concrete Finishes:

1. Provide forming for mock-ups as required for finish work shown and specified for the Work. Place embedded materials in mock-up. Construct forms using facing materials such as form liners, where required, to provide specified finishes and to the mock-up requirements specified in Section 03 30 00, Cast-In-Place Concrete. Obtain Engineer's acceptance of each mock-up prior to starting forming for the Work. Do not remove mock-up(s) until directed by Engineer.

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Submit the following:

1. Samples:

a. Plywood form material used for smooth form finish, four inches square minimum.

2. Shop Drawings: When requested by Engineer, submit Shop Drawings showing and indicating general construction of individual forms, including:

a. Jointing.

b. Special formed joints or reveals.

c. Location, pattern, and details of form tie placement, removal, and repair procedures.

d. Location and details for temporary openings.

e. Other items that would visually affect the finished concrete.

3. Design of Temporary Measures: Design of formwork and falsework is Contractor's responsibility. Submit the following:

a. Falsework layout drawings with the seal and signature of Contractor's or Supplier's professional engineer. Layout drawings shall show bracing details, waler arrangements, location of shores, joint forming details, and details at connections to previously placed concrete. Engineer's review will be for general conformance to the requirements of the Contract Documents and ACI 347, as indicated for delegated design in the General Conditions.

b. Design calculations for formwork and falsework, when requested by Engineer.

c. Certification letter from Contractor's or Supplier's professional engineer stating that in- place falsework was inspected and complies with the intent of the falsework design.

4. Product Data: Manufacturer's data for proprietary materials, including form coatings, manufactured form systems, ties and accessories.

5. Manufacturer's Instructions: Installation instructions for proprietary materials, including form coatings, manufactured form systems, ties and accessories.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage:

1. Upon delivery to the Site, place materials in area protected from weather.

2. Store materials in accordance with manufacturer's recommendations.

B. Store materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective, waterproof covering. Provide for adequate air circulation or ventilation under cover.

C. Handle materials in accordance with the manufacturers' recommendations. Do not damage materials during handling.

PART 2 – PRODUCTS

2.01 SYSTEM PERFORMANCE

A. Design Criteria:

1. Design, erect, support, brace, and maintain forming in accordance with ACI 347, ACI SP-4, and ACI 303R so that forming safely supports vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by forming system or in-place construction that has attained adequate strength for the purpose. Construct forming so that concrete members and structures are of correct size, shape, alignment, elevation, and position.

2. Design forms and falsework to include values of live load, dead load, weight of moving equipment operated on forming, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

3. Provide shores and struts with positive means of adjustment capable of taking up forming settlement during concrete placing operations, using wedges or jacks, or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

4. Support form facing materials by structural members spaced sufficiently close to prevent beyond tolerance deflection, in accordance with ACI 117. Fit forms placed in successive

units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances. For long-span members without intermediate supports, provide camber in forming as required for anticipated deflections resulting from weight and pressure of fresh concrete and construction loads.

5. Design and construct forming to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.

6. Provide forming sufficiently tight to prevent leakage of cement paste during concrete placing. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

7. Omit side forms of footings and place concrete directly against excavation only when requested by Contractor in writing and accepted by Engineer in writing. When omission of forms is accepted, provide additional concrete required beyond minimum design profiles and dimensions of footings as shown or indicated on the Drawings. No additional compensation will be paid to Contractor for additional concrete required.

2.02 FORM MATERIALS

A. Forms for Smooth Finish Concrete:

1. See Section 03 30 00, Cast-In-Place Concrete, for location of Smooth Finish Concrete.

2. Unless otherwise shown or indicated in the Contract Documents, construct forming for smooth concrete surfaces with plywood, metal, metal-framed plywood-faced, or other panel type materials acceptable to Engineer, to provide continuous, straight, smooth as-cast surfaces with no wood grain or other surface texture imparted by forming. Provide in largest practical sizes to minimize number of joints and to conform to joint system shown or specified in the Contract Documents. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Forms for Standard Finish Concrete:

1. See Section 03 30 00, Cast-In-Place Concrete, for location of Standard Finish Concrete.

2. Form concrete surfaces designated to have standard formed finish with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least two edges and one side.

C. Forms for Architecturally Finished Concrete:

1. Form finish concrete surfaces with units of face design, size, arrangement, and configuration as shown or as required to comply with approved Project job mock-up. Provide solid backing and form supports to ensure stability of form liners.

2. Form Material: Overlaid plywood in accordance with NIST PS 1. Provide B-B high density overlaid concrete form, Class I.

3. Form Liners: As specified in Section 03 11 16, Architectural form liners.

4. Form Reuse: To be determined by Engineer at time of installation.

5. Rustication Joints: Rigid PVC in profile shown or indicated.

6. Panel Joints: Conceal joints behind rustication joints, unless approved by Engineer in writing.

D. Cylindrical Columns and Supports:

1. Form round section members with paper or fiber tubes, constructed of laminated plies using water resistant type adhesive with wax impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.

2. Provide manufacturer's seamless units to minimize spiral gaps or seams.
3. Fiberglass or steel forms may be used for cylindrical columns if accepted by Engineer in writing.

E. Form Ties:

1. Provide factory-fabricated metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal.
2. Unless otherwise shown or indicated in the Contract Documents, provide ties so that portion of tie remaining within concrete after removal of exterior parts of tie is at least 1.5 inches from the outer concrete surface. Unless otherwise shown or indicated in the Contract Documents, provide form ties that will leave a hole no larger than one-inch diameter in concrete surface.
3. Ties shall have waterstops on all exterior, below-grade walls, and walls subject to hydrostatic pressure.
4. Ties shall leave a uniform, circular hole when forms are removed.
5. Do not use removable ties unless accepted by Engineer. Removable ties are not allowed on exterior below-grade walls or walls subject to hydrostatic pressure. If removable ties are accepted, Contractor shall submit hole repair details for Engineer approval.
6. Wire ties are not allowed.
7. Do not use reinforcing bars shown by the Drawings as part of the form tie system unless approved by Engineer.
8. Provide stainless steel form ties for areas with architectural finish. When used, tiebreak back point shall be at least one inch from outer concrete surface.

F. Form Coatings:

1. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds. For concrete surfaces that will be in contact with potable water or water that will be treated to become potable, form coating shall be a mineral oil base coating.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine substrate and conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 FORM CONSTRUCTION

A. Construct forms in accordance with ACI 347; to the exact sizes, shapes, lines, and dimensions shown; as required to obtain accurate alignment, location, and grades; to tolerances specified; and to obtain level and plumb work in finish structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes. Finish shall be in accordance with approved mock-up or sample panel, when specified.

B. Allowable Tolerances:

1. Construct forming to provide completed concrete surfaces complying with tolerances

specified in ACI 117, ACI 301, and ACI 347.

a. Architectural finish forming, and where shown or indicated on the Drawings, shall be Class A surface, 1/8-inch offset.

b. Other surfaces exposed to view shall be Class B surface, 1/4-inch offset.

c. Other surfaces shall be Class C surface, 1/2-inch offset.

2. Tolerances apply to form offsets and to irregularities within the formed surface when measured with a straightedge over a five-foot distance.

C. Install forming and accessories for facilities in accordance with manufacturer's instructions, Laws and Regulations, and the Contract Documents.

D. Fabricate forms for easy removal without damaging concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

E. Provide temporary openings where interior area of forming is inaccessible for cleanout, for inspection before concrete placement, and for placing concrete. Brace temporary closures and set tightly to forms to prevent loss of cement paste. Locate temporary openings on forms in locations as inconspicuous as possible, consistent with requirements of the Work. Form intersecting planes of openings to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

F. Falsework:

1. Erect falsework and support, brace, and maintain falsework to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.

2. Provide wedges, jacks or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce finished Work of required dimensions.

G. Forms for Smooth Finish Concrete:

1. Do not use metal cover plates for patching holes or defects in forms.

2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.

3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.

4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.

5. Form molding shapes, recesses, rustication joints and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

H. Corner Treatment:

1. Form exposed corners of beams, walls, foundations, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown or indicated in the Contract Documents. Chamfer exposed corners.

2. Form chamfers with 3/4-inch by 3/4-inch strips, unless otherwise shown or indicated in the Contract Documents, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Use rigid PVC chamfers for architecturally formed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
3. Reentrant or internal and unexposed corners may be formed either square or chamfered.

I. Joints:

1. For joint treatment, comply with Section 03 15 00, Concrete Accessories. Locate joints as shown and specified.

J. Openings and Built-In Work:

1. Provide openings in concrete forming shown or required under other Sections or other contracts. Refer to Paragraph 1.1.B of this Section for coordination requirements.
2. Accurately place and securely support items to be built into forms.

K. Sealing Forming:

1. Forming joints shall be tight-fitting or otherwise sealed to prevent loss of cement paste.
2. Provide forming resting against concrete surfaces with compressible gasket material between the concrete and edge of form, to fill irregularities and create tight seal.

L. Cleaning and Tightening:

1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after placing concrete, as required to eliminate cement paste leaks.

M. Tie Hole Repair:

1. Repair tie holes in accordance with Section 03 30 00, Cast-In-Place Concrete.

3.03 FORM COATINGS

A. Coat form contact surfaces with non-staining form-coating compound before installing reinforcing materials. Do not allow excess form coating material to accumulate in forms or come into contact with surfaces that will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with non-staining, rust-preventative form oil, or otherwise protect against rusting. Do not use rust-stained steel forming.

3.04 INSTALLATION OF EMBEDDED ITEMS

A. Set and build into forming anchorage devices and other embedded items, shown, specified, or required under other Sections. Refer to Paragraph 1.1.B of this Section for coordination requirements. Use necessary setting drawings, diagrams, instructions, and directions.

B. Edge Forms and Screeds Strips for Slabs:

1. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units to support screeds.

3.05 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Before placing concrete, check ties, tie cones, tie waterstops, embedded items, form coatings, forming stability, alignment, and tolerances. Make corrections and adjustments to ensure forming complies with intent of the forming design, proper stability of forming systems, and accurate size and location of concrete members.
2. During concrete placing, check forming and related supports to ensure that forms are not displaced, and that completed Work will be within specified tolerances.
3. If forms are unsatisfactory in any way, either before or during concrete placing, stop or postpone placing of concrete until defects are corrected as required by Contractor's or Supplier's professional engineer and accepted by Engineer.

3.06 REMOVAL OF FORMS

A. Determination of time between placing concrete and removing forms is Contractor's responsibility. Requirements specified in this Section are minimum times and requirements intended to ensure that concrete will support its own weight, and do not consider additional effects of the construction. Additional effects of the construction shall be accounted for by Contractor when determining time for removing forming. Time for removing of forms is subject to Engineer's acceptance.

B. Comply with requirements of ACI 301 and ACI 347

C. Continue curing, including bottom surfaces of slabs and beams, after form removal in accordance with Section 03 30 00 - Cast-In-Place Concrete.

3.07 PERMANENT SHORES

A. Provide permanent shores in accordance with ACI 347.

B. Reshores are not allowed.

3.08 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in the construction. Do not use split, frayed, delaminated, or otherwise damaged form facing material. Apply form coating compound material to concrete contact surfaces as specified for forming.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Form surfaces are subject to Engineer's approval.

END OF SECTION

SECTION 03 15 00 – CONCRETE ACCESSORIES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete accessories.

B. Related Sections:

1. Section 03 11 00 - Concrete Forming.
2. Section 03 60 00 - Grouting.
3. Section 07 92 00 - Joint Sealants.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 301, Standard Specifications for Structural Concrete.
2. ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Layout of construction and expansion joint locations. Submit and obtain approval prior to submitting concrete reinforcement Shop Drawings.
   b. Layout of all control joint locations.
2. Samples:
   a. Submit Sample of foam rubber and cork expansion joint fillers.

C. Informational Submittals: Submit the following:

1. Manufacturer's Instructions: Manufacturer's specifications and installation instructions for all materials required.

1.04 DELIVERY, STORAGE AND HANDLING

A. Conform to Section 01 60 00, Product Requirements, and this Section.

1. Deliver materials to Site to ensure uninterrupted progress of the Work.
2. Store concrete joint materials on platforms or in enclosures or covered to prevent contact with ground and exposure to weather and direct sunlight. Comply with manufacturer's storage and protection requirements.

PART 2 – PRODUCTS

2.01 PREFORMED EXPANSION JOINT FILLER

A. Provide preformed expansion joint filler complying with ASTM D1752, Type I (sponge rubber) or

Type II (cork).

2.02 CONCRETE CONSTRUCTION JOINT ROUGHENER

A. Provide water-soluble non-flammable, surface-retardant roughener.

B. Product and Manufacturer: Provide one of the following for the types of joints specified:

1. Rugasol-S, by Sika Corporation for horizontal joints only.
2. Concrete Surface Retarder-Formula S, by Euclid Chemical Company, for horizontal joints only.
3. Concrete Surface Retarder-Formula F, by Euclid Chemical Company, for vertical joints only.
4. TK-6100 Concrete Form Surface Retarder, by TK Products.
5. Or equal.

2.03 EPOXY BONDING AGENT

A. Provide a two-component epoxy-resin bonding agent.

B. Product and Manufacturer: Provide one of the following:

1. Sikadur 32 Hi-Mod LPL, by Sika Corporation.
2. Eucopoxy LPL, by the Euclid Chemical Company.
3. Resi-Bond J-58, by Dayton Superior.
4. Or equal

2.04 EPOXY-CEMENT BONDING AGENT

A. Provide three component epoxy resin-cement blended formulated as bonding agent.

B. Product and Manufacturer: Provide one of the following:

1. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation.
2. Duralprep A.C., as manufactured by the Euclid Chemical Company.
3. Emaco P24, as manufactured by MBT/ChemRex.
4. Or equal.

2.05 JOINT SEALANT AND ACCESSORIES

A. For joint sealants and accessories used on isolation joints, control joints, and expansion joints, refer to Section 07 92 00, Joint Sealants.

2.06 CONCRETE BOND BREAKERS

A. Provide asphalt-saturated rag felt building paper, not less in weight than commercially known as 15 pound felt building paper, which weighs 15 pounds per 100 square feet.

B. Chemical Bond Breaker:

1. Provide medium solids resin solution chemical concrete bond breaker complying with ASTM C309, Type I, Class B

PART 3 – EXECUTION

3.01 INSPECTION

A. Contractor and installing Subcontractor, if any, shall examine substrate and conditions under which the Work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do

not proceed with the Work until unsatisfactory conditions are corrected.

3.02 CONSTRUCTION JOINTS

A. Comply with requirements of ACI 301 and the Contract Documents.

B. Locate and install construction joints as shown or indicated on the Drawings. Where not shown or indicated, locate joints to not impair strength of the structure; position joints at points of minimum shear. Location of joints shall be approved by Engineer. In addition to joints shown or indicated on the Drawings, locate construction joints as follows:

1. In foundation mats, locate joints at spacing of approximately 40 feet. Joints shall be located within middle third of element span, unless otherwise shown or indicated on the Drawings. Element span shall be considered distance between piles or, as determined by Engineer, distance between bearing elements, such as columns, exterior walls and interior walls. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

2. In walls, locate joints at a maximum spacing of 40 feet. Locate joints away from wall intersections a minimum of one-quarter of the clear span distance between wall intersections measured horizontally.

3. In structural slabs and beams, joints shall be located within middle third of element span and shall be located in compliance with ACI 301, unless otherwise shown or indicated on the Drawings.

4. In slabs on grade, locate joints at spacing of approximately 40 feet. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

C. Horizontal Joints:

1. Roughen concrete at interface of construction joints by abrasive blasting, hydroblasting, or using surface retardants and water jets to expose aggregate and remove accumulated concrete on projecting rebar immediately subsequent to form stripping, unless otherwise approved by Engineer. Immediately before placing fresh concrete, thoroughly clean existing contact surface using stiff brush or other tools and stream of pressurized water. Surface shall be clean and wet, and free from pools of water at time of placing fresh concrete.

2. Remove laitance, waste mortar, and other substances that may prevent complete adhesion. Where joint roughening was performed more than seven days prior to concrete placing or where dirt or other bond reducing contaminants are on surface, perform additional light abrasive blasting or hydroblasting to remove laitance and all bond-reducing materials just prior to concrete placement.

3. Provide over contact surface of concrete a six-inch layer of Construction Joint Grout as specified in Section 03 60 00, Grouting. Place fresh concrete before grout has attained its initial set. Placement of grout may be omitted if concrete mix has slump increased to at least six inches by addition of high range water reducer.

D. Vertical Joints:

1. Apply roughener to the form in thin, even film by brush, spray, or roller in accordance with manufacturer’s instructions. After roughener is dry, concrete may be placed.

2. When concrete has been placed, remove joint surface forms as early as necessary to allow for removal of surface retarded concrete. Forms covering member surfaces shall remain in place as required under Section 03 11 00, Concrete Forming. Wash loosened material off with high- pressure water spray to obtain roughened surface subject to approval by Engineer. Alternately, surface shall be roughened by abrasive blasting or hydroblasting to expose aggregate. Outer one-inch of each side of joint face shall be masked and protected from blasting to avoid damaging member surface.

E. Satisfactory Roughened Surface:

1. Roughen concrete surface so that amplitude between high and low point on any 2-inch square is at least 1/4 inch.
2. Remove all laitance, waste mortar or other substance, which may prevent complete adhesion.
3. Expose clean coarse aggregate.
4. Do not undercut edges of coarse aggregate particles.
5. After roughening, wash and rinse with potable water.
6. Continue rinsing as long as there is any trace of cloudiness of the rinse water.
7. Where the rinsing occurs more than 2 days prior to placing the next lift or where the work in the area subsequent to the cleaning causes dirt or debris to ne deposited on the surface, the surface shall be rinsed again as the last operation prior to placing the next lift.

3.03 EXPANSION JOINTS

A. Comply with requirements of ACI 301 and this Section.

B. Locate and install expansion joints as shown and indicated in the Contract Documents. Install joint filler in accordance with manufacturer's instructions. Install sealants as specified in this Section.

3.04 CONTROL JOINTS

A. Provide control joints in non-water bearing slabs on grade as shown or indicated on the Drawings. Where control joints are not shown or indicated on the Drawings, space control joints at 24 to 36 times thickness of slab in both directions. Locate control joints only at places approved by Engineer.

B. A groove, with depth of at least 25 percent of the member thickness, shall be tooled, formed, or saw-cut in concrete. Groove shall be filled with joint sealant material in accordance with Section 07 92 00, Joint Sealants.

C. Where control joint is formed by sawcutting, make sawcut in presence of Engineer immediately after concrete has set sufficiently to support the saw and be cut without damage to concrete. Keep concrete continually moist during cutting. Joints shall be approximately 1/8-inch wide.

D. Control joints may be formed with tool or by inserting joint forming strip. After concrete has achieved design strength, remove upper portion of joint forming strip and fill void with sealant.

3.05 ISOLATION JOINTS

A. Provide isolation joint where sidewalk or other slab on grade abuts a concrete structure and slab on grade is not shown doweled into that structure. Form isolation joint by 1/2-inch joint filler with upper 1/2-inch of joint filled with sealant.

3.06 BONDING AGENT

A. Use epoxy bonding agent for bonding of fresh concrete to concrete that has been in place for at least 60 days, and for bonding to existing concrete.

B. Use epoxy-cement bonding agent for the following:

1. Bonding toppings and concrete fill to concrete that has been in place for at least 60 days, and for bonding to existing concrete.
2. For locations where bonding agent is required and concrete cannot be placed within open time period of epoxy bonding agent.

3. Bonding of horizontal construction joints where joints are required in accordance with the Drawings or approved by Engineer for foundation mats that are five feet thick or greater.

C. Use cement-water slurry as bonding agent for toppings and concrete fill to new concrete. Cement water slurry shall be worked into surface with stiff bristle broom and place the concrete before cement-water slurry dries.

D. Handle and store bonding agent in accordance with manufacturer's printed instructions and safety precautions.

E. Mix bonding agent in accordance with manufacturer's instructions.

F. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with bonding agent not less than 1/16-inch thick. Place fresh concrete while bonding agent is still tacky (within its open time), without removing in-place bonding agent coat, and as directed by manufacturer.

END OF SECTION

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SECTION 03 20 00 – CONCRETE REINFORCING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete reinforcing.
2. Extent of concrete reinforcing is shown and indicated in the Contract Documents.
3. Work includes fabrication and placement of reinforcing including bars, ties, and supports, and welded wire fabric for concrete, encasements, and fireproofing.

B. Related Sections:

1. Section 03 15 00 - Concrete Accessories.
2. Section 04 20 00 - Unit Masonry.
3. Section 05 05 33 - Anchor Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 315, Details and Detailing of Concrete Reinforcement.
2. ACI 318, Building Code Requirements for Structural Concrete.
3. ACI 350, Code Requirements for Environmental Engineering Concrete Structures. ANSI/AWS D1.4, Structural Welding Code - Reinforcing Steel.
4. ASTM A82, Specification for Steel Wire, Plain, for Concrete Reinforcement.
5. ASTM A615, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
6. ASTM A706, Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
7. ASTM A775, Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A1064, Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
9. Concrete Reinforcing Steel Institute (CRSI), CRSI 1MSP, Manual of Standard Practice.
10. ICC Evaluation Service (ES) AC 308, Acceptance Criteria for Post-Installed Anchors in Concrete Elements.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Shall meet requirements of ASTM E329 and shall have experience in the testing welded splices of reinforcing steel and tension testing of reinforcing bars set in adhesive in hardened concrete.
2. Installer of Adhesive Dowels: Shall be experienced and certified by manufacturer of adhesive as possessing necessary training for installing manufacturer’s products. Distributors or manufacturer’s representatives shall not provide product training unless qualified as certified trainers by anchor manufacturer.

B. Certifications:

1. Weld Procedures: For types of splices and grades of reinforcing used in the Work, weld procedures for welded reinforcing steel splices shall be certified in accordance with ANSI/AWS D1.4.

2. Welders: For types of splices and grades of reinforcing used in the Work, welders shall be certified for welding reinforcing steel splices in accordance with ANSI/AWS D1.4.

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Submit the following:

1. Shop Drawings:

a. Drawings for fabricating, bending, and placing concrete reinforcing. Comply with ACI 315, Parts A and B.

b. For walls, show elevations at minimum scale of 1/4-inch to one foot.

1) Elevations shall show all openings and reference details that identify additional reinforcing required around each opening.

2) Elevations shall denote each wall intersection and reference a detail that identifies additional reinforcing required at wall intersection. As an alternate to providing separate details for each wall intersection, provide overall plan detailing only the additional wall intersection reinforcing for each wall intersection.

c. For slabs and mats, show top and bottom reinforcing on separate plan views.

1) Plans shall show all openings and shall reference details that identify additional reinforcing around each opening.

d. Show bar schedules, stirrup spacing, diagrams of bent bars, location of bar splices, length of lap splices, arrangements, and assemblies, as required for fabricating and placing concrete reinforcing unless otherwise noted.

e. Provide plans and elevations detailing location, spacing, and lengths of masonry wall dowels, where masonry is required. Coordinate location of dowels with masonry openings and with standard modular spacing. Submit masonry wall dowels with reinforcing submittal for element into which masonry dowel will be embedded. Coordinate with Section 04 20 00, Unit Masonry Construction.

f. Splices shall be kept to a minimum. Avoid, when possible, splices in regions of maximum tensile stresses.

g. Drawings detailing location of all construction and expansion joints, as required under Section 03 15 00, Concrete Accessories, shall be submitted and approved before Shop Drawings for reinforcing are submitted.

h. Drawings detailing location, spacing, edge distance, and embedment depth of adhesive dowels. Adhesive system shall be submitted and approved before Shop Drawings with adhesive dowels are submitted.

1) Product Data:

a) Manufacturer’s product data for adhesive, if not submitted under other Sections.

b) Adhesive manufacturer’s test data and ICC ES report to verify specified capacity of adhesive dowels.

2. Certificates:
    a. Steel manufacturer's certificates of mill analysis, tensile, and bend tests for reinforcing steel.
    b. Certification of welders and weld procedures for splices.
    c. Adhesive manufacturer's certification verifying that installer is qualified and using proper installation procedures.
3. Manufacturer's Instructions:
    a. Installation instructions for adhesive systems.
    b. Special Procedure Submittals; Description of reinforcing weld locations and weld procedures.

1.05 DELIVERY, HANDLING, AND STORAGE

A. Conform to Section 01 60 00, Product Requirements, and this Section.

B. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.

C. Store concrete reinforcing products to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: Shall be deformed in accordance with ASTM A615, and as follows:
    1. Provide Grade 60 for all bars, unless indicated otherwise.

B. Mechanical Couplers: Reinforcement bars may be spliced with mechanical connection. Connection shall be full mechanical connection that shall develop in tension or compression, as required, at least 125 percent of specified yield strength (fy) of bar in accordance with ACI 318 and ACI 350. Where splices at the face of wall are shown or approved by Engineer, form saver-type mechanical couplers may be used. Form-saver couplers shall have integral plates designed to positively connect coupler to formwork.

C. Steel Wire: Shall be in accordance with ASTM A82.

D. Welded Wire Reinforcement, Plain and Deformed: Shall be in accordance with ASTM A1064.
    1. Furnish in flat sheets, not rolls.
    2. Epoxy coated welded wire reinforcement shall be according to ASTM884.

E. Column Spirals: Hot-rolled rods for spirals, conforming to ASTM A615.

F. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing in place.
    1. Use wire bar type supports complying with CRSI 1 MSP recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.
    2. For slabs on grade, use precast concrete blocks, four inches square in plan, with embedded tie wire as specified by CRSI 1 MSP. Precast concrete blocks shall have same or higher compressive strength as specified for concrete in which they are

located.

3. For concrete surfaces where legs of supports are in contact with forms, provide supports complying with CRSI 1 MSP as follows:
   a. At formed surfaces in contact with soil, weather, or liquid, or located above liquid, supports shall be CRSI Class 1 for maximum protection. Plastic coating on legs shall extend at least 0.5-inch upward from form surface.
   b. At interior dry surfaces (not located above liquid), supports shall be either Class 1 or Class 2 for moderate protection.
   c. Over waterproof membranes, use precast concrete chairs.

G. Adhesive Dowels:
   1. Dowels:
      a. Dowel reinforcing bars shall be deformed in accordance with ASTM A615, Grade 60.
   2. Adhesive:
      a. Requirements for adhesive are specified under requirements for concrete adhesive anchors in Section 05 05 33 - Anchor Systems.

2.02 FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI 1 MSP. In case of fabricating errors, do not re-bend or straighten reinforcing in manner that injures or weakens material.

B. Unacceptable Materials: Reinforcing with one or more of the following defects is not allowed:
   1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.
   2. Bends or kinks not shown on approved Shop Drawings.
   3. Bars that do not meet or exceed their ASTM specification requirements when hand-wire- brushed, with respect to cross section, nominal weight, or average height of deformations.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the substrate and conditions under which concrete reinforcing is to be placed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with applicable recommendations of Laws and Regulations, applicable standards, and CRSI 1 MSP for details and methods of reinforcing placement and supports, and as required below.

B. Clean reinforcing to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Position, support, and secure reinforcing against displacement during formwork construction and concrete placing. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required. The use of dropped bars will not be allowed. Reinforcing bars intended as main reinforcing and temperature reinforcing shall

remain in their intended plane.

1. Place reinforcing to obtain minimum concrete coverages specified in ACI 318, AC I 350, and the Contract Documents. Arrange, space, and securely tie bars and bar supports together with 16-gage wire to hold reinforcing accurately in position during concrete placing. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
2. Prior to placing concrete, using surveyor's level or string line, demonstrate to Engineer that specified cover of reinforcing has been attained.
3. Do not secure reinforcing steel to forms with wire, nails, or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.
4. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than 1-bar diameter, or enough to exceed the inspection tolerances, the resulting arrangement of bars shall be subject to review and acceptance by ENGINEER.

D. Allowable Placing Tolerances: Comply with ACI 318, Chapter 7 - Details of Reinforcement, and ACI 350, Chapter 7 - Details of Reinforcement, except as specified in this Section:

1. Concrete surfaces in contact with liquid shall have minimum of two inches of concrete over reinforcing steel.

E. Provide sufficient number of supports of strength required to carry reinforcing. Do not place reinforcing bars more than two inches beyond last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Lap Splices:

1. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars as shown on the Drawings.

G. Install welded wire fabric in lengths as long as practical. Lap adjoining pieces at least one full mesh and lace splices with 16-gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

H. Mechanical Couplers:

1. Mechanical butt splices shall be in accordance with recommendations of mechanical splicing device manufacturer. Butt splices shall develop 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Bars shall be flame- dried before butt splicing. Provide adequate jigs and clamps or other devices to support, align, and hold longitudinal centerline of bars being butt spliced in straight line.

I. Welded Splices:

1. When field welding of reinforcing is required on the Drawings or allowed by Engineer in writing, welding of reinforcing bars shall conform to ANSI/AWS D1.4. Preheating and rate of cooling requirements shall be based on bar steel chemistry and ANSI/AWS D1.4. Welded splices shall be sized and constructed to transfer minimum of 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Unless otherwise allowed by Engineer in writing, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.
2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural

steels, shall conform to applicable provisions of ANSI/AWS D1.4 and Engineer's requirements for the particular application.

3. After completing welding on coated reinforcing bars, repair coating damage as specified in this Section. Welds and steel splice members, when used to splice bars, shall be coated with same material used for repair of coating damage.

J. Adhesive Dowels:

1. Comply with manufacturer's written installation instructions and requirements of this Section.
2. Drill holes to adhesive system manufacturer's recommended drill bit diameter and to specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances indicated in ANSI B212.15. Core-drilled holes shall not be permitted.
3. Before setting adhesive dowel, hole shall be made free of dust and debris by method recommended by adhesive system manufacturer. Brush the hole with adhesive system manufacturer-approved brush and blow hole clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.
4. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.
5. Prior to injecting adhesive into the drilled hole, dispense to an appropriate location for waste an initial amount of adhesive from the mixing nozzle until adhesive is a uniform color, indicating that product is properly mixed.
6. Inject adhesive into hole through injection system-mixing nozzle and extension tubes (as required) placed to bottom of hole. Withdraw nozzle's discharge end as adhesive is placed while keeping nozzle immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during dowel placing.
7. Twist dowel during insertion into partially-filled hole to ensure full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.
8. Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining or adjacent Work that could impose or impart load on the dowels. Do not begin adjoining or adjacent Work until dowels are successfully tested or when approved by Engineer.
9. Limitations:
    a. At time of dowel installation, concrete shall have compressive strength (f'c) of not less than 2,500 psi.
    b. At time of dowel installation, concrete shall have age of not less than 21 days.
    c. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures, necessary to ensure that base material temperature complies with requirements of adhesive systems manufacturer during installation and adhesive system curing.
    d. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by adhesive system manufacturer. Cost of corrective measures, including but not limited to redesign of dowels due to decreased capacities, shall be paid by Contractor.

3.03 FIELD QUALITY CONTROL

A. Site Inspections and Tests:

1. General:

a. Do not place concrete until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

b. Do not close up formwork for walls and other vertical members until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

c. Correct defective Work by removing and replacing or correcting, as required by Engineer.

d. Contractor shall pay cost of corrections and subsequent testing required to confirm integrity of post-installed anchors.

e. Testing laboratory shall submit test results to Contractor and Engineer within 24 hours of completion of test.

2. Site Tests:

a. Owner Will employ testing laboratory to perform field quality testing of adhesive dowels at the Site.

1) Testing shall comply with ASTM E488.

2) Test at least ten percent of each type of adhesive dowel. If one or more dowels fail the test, Contractor shall pay cost to test all dowels of same diameter and type installed on the same day as the failed dowel.

3) Test dowels to 60 percent of specified yield strength. Engineer will direct which dowels are to be tested.

4) Apply test loads with hydraulic ram.

5) Displacement of dowels shall not exceed D/10, where D is nominal diameter of dowel.

3. Inspection of Welded Splices: Owner will employ testing laboratory to perform field quality control testing of welded splices. All welded splices shall be visually inspected. Radiographically test minimum of five percent of butt splice welds. Repair defective welds so that welds are completely sound.

B. Manufacturer's Services:

1. Provide qualified adhesive manufacturer's representative at the Site during initial installation of adhesive dowel systems to train installing personnel in proper selection and installation procedures. Manufacturer's representative shall observe to verify that installer demonstrates proper installation procedures for adhesive dowels and adhesive material. Each installer shall be certified in writing by manufacturer as qualified to install adhesive anchors.

END OF SECTION

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SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install cast-in-place concrete.
2. Concrete shall be in accordance with requirements of ACI 301 and ACI 350.5 unless otherwise specified.
3. The Work includes providing concrete consisting of Portland cement, fine and coarse aggregate, water, and approved admixtures; combined, mixed, transported, placed, finished, and cured. The Work also includes:
    a. Providing openings in concrete to accommodate the Work under this and other Sections, and building into the concrete all items such as sleeves, frames, anchorage devices, inserts, and all other items to be embedded in concrete Work.

B. Coordination:

1. Review installation procedures under other Sections and coordinate installation of items to be installed in the concrete Work.
2. Notify other contractors in advance of placing concrete to provide other contractors with sufficient time for installing items included in their contracts that are to be installed in the concrete Work.

C. Classifications of Concrete:

1. Forming and finishing on all concrete Work shall be either:
    a. Smooth Finish Concrete: applies to all visible interior concrete and all visible exterior concrete to one foot below grade or one-foot below the low-water line and is not Architectural Finished Concrete.
        1) Refer to Section 03 11 00 Part 2.2.A for forming requirements.
        2) Finish is required to be a smooth form finish (Section 03 30 00 Part 3.6.B) followed by a grout cleaned finished (Section 03 30 00 Part 3.6.C).
    b. Standard Finish Concrete: applies to all exterior concrete that is neither Smooth Finish Concrete nor Architectural Finish Concrete.
        1) Refer to Section 03 11 00 Part 2.2.B for forming requirements.
        2) Refer to Section 03 30 00 Part 3.6.A for finish requirements.
    c. Architectural Finish Concrete: applies to exterior concrete that has a form liner.
        1) Refer to Section 03 11 00 Part 2.2.C and Section 03 11 16 for form and forming requirements.
        2) Refer to architectural drawings for finish requirements.
2. Class "A" concrete shall be steel-reinforced and includes the following:
    a. All concrete, unless otherwise shown or indicated.
3. Class “AF” concrete shall be steel-reinforced and may be used in lieu of Class “A” concrete for the following:

a. Walls and foundations thicker than 16 inches.

4. For the following locations, Class “A” and/or “AF” shall include the Crystalline Waterproofing Admixture and shall be designated Class “AW” and “AFW”.
   a. New Elevator Shaft.
      1) Elevator Pit Walls and Foundation Slab
5. Class “B” concrete shall be placed without forms or with simple forms, with little or no reinforcing, and includes the following, unless otherwise shown or indicated:
   a. Concrete fill within structures.
   b. Duct banks.
   c. Unreinforced encasements.
   d. Curbs and gutters.
   e. Sidewalks.
   f. Thrust blocks.
6. Class “D” concrete shall be unreinforced and used where required as concrete fill under foundations, filling abandoned piping, and where “lean concrete” or “mudmat” is shown or indicated in the Contract Documents.
7. Class “SC” self-consolidating concrete may be used at the discretion of the Contractor in lieu of classes above. It shall comply with the durability and shrinkage requirements of whichever mix is being proposed to substitute.

D. Related Sections:
   1. Section 03 15 00 – Concrete Accessories.
   2. Section 03 20 00 – Concrete Reinforcing.
   3. Section 03 60 00 – Grouting.

1.02 REFERENCES

A. Standards referenced in this Section are:
   1. AASHTO M 182, Specification for Burlap Cloth Made From Jute or Kenaf and Cotton Materials.
   2. AASHTO T318, Standard Method of test for Water Content of Freshly Mixed Concrete Using the Microwave Oven.
   3. ACI 117, Specifications for Tolerances for Concrete Construction and Materials and Commentary.
   4. ACI 301, Specifications for Structural Concrete.
   5. ACI 305.1, Specification for Hot Weather Concreting.
   6. ACI 306.1, Cold Weather Concreting.
   7. ACI 318, Building Code Requirements for Structural Concrete and Commentary.
   8. ACI 350/350R, Code Requirements for Environmental Engineering Concrete Structures and Commentary.
   9. ASTM C31/C31M, Practice for Making and Curing Concrete Test Specimens in the Field.
   10. ASTM C33, Specification for Concrete Aggregates.
   11. ASTM C39/C39M, Test Method for Compressive Strength of Cylindrical Con-crete Specimens.

12. ASTM C42/C42M, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
13. ASTM C94/C94M, Specification for Ready-Mixed Concrete.
14. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
15. ASTM C138/C138M, Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
16. ASTM C143/C143M, Test Method for Slump of Hydraulic- Cement Concrete.
17. ASTM C150, Specification for Portland Cement.
18. ASTM C157/C157M, Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
19. ASTM C171, Specification for Sheet Materials for Curing Concrete.
20. ASTM C172, Practice for Sampling Freshly Mixed Concrete.
21. ASTM C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
22. ASTM C260, Specification for Air-Entraining Admixtures for Concrete.
23. ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
24. ASTM C330, Specification for Lightweight Aggregates for Structural Concrete.
25. ASTM C494/C494M, Specification for Chemical Admixtures for Concrete.
26. ASTM C618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
27. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
28. ASTM C989, Specification for Slag Cement for Use in Concrete and Mortars.
29. ASTM C1017, Specification for Chemical Admixtures for Use in Producing Flowing Concrete
30. ASTM C1064/C1064M, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
31. ASTM C1077, Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
32. ASTM C1240, Specification for Silica Fume Used in Cementitious Mixtures.
33. ASTM C1260, Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
34. ASTM C1293, Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
35. ASTM C1567, Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
36. ASTM C1610, Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique.
37. ASTM C1611, Test Method for Slump Flow of Self-Consolidating Concrete.
38. ASTM C1621, Test Method for Passing Ability of Self-Consolidating Concrete by J-Ring.
39. ASTM D1042, Test Method for Linear Dimensional Changes of Plastics Caused by Exposure to Heat and Moisture.

40. ASTM D3574, Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams.
41. ASTM E96/E96M, Test Methods for Water Vapor Transmission of Materials
42. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
43. ASTM E1643, Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
44. ASTM E1745, Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
45. NRMCA, National Ready Mixed Concrete Association.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Concrete Testing Laboratory:
    a. Employ independent testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes. Employ different laboratories for design of concrete mixes and field testing.
        1) Testing agency shall be in accordance with ASTM E329 and ASTM C1077.
        2) Testing laboratory shall have been inspected and passed within previous two years by Cement and Concrete Reference Laboratory (CCRL) of NIST for: testing concrete aggregates, and for preparing and testing concrete trial batches with or without admixtures. Testing laboratory shall provide documentation indicating how deficiencies, if any, in most recent CCRL inspection report were corrected.
        3) Selection of testing laboratory is subject to Owner's acceptance.
        4) Submit written description of proposed concrete testing laboratory giving qualifications of personnel, laboratory facilities, and equipment, and other information requested by Engineer.
2. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.
3. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
4. Flatwork Finisher: Unless otherwise permitted, at least one person on finishing crew shall be certified as an ACI Flatwork Finisher, or equivalent.
5. Water Reducing Admixture Manufacturer:
    a. Water-reducing admixtures shall be manufactured under strict quality control in facilities operated under a quality assurance program. Submit copy of manufacturer's quality assurance handbook to document program existence.
    b. Manufacturer shall maintain a concrete testing laboratory approved by CCRL at NIST.
    c. Manufacturer shall be capable of providing services of qualified field service representatives at the Site.

B. Laboratory Trial Batch:

1. Each concrete mix design specified shall be verified by laboratory trial batch, unless indicated otherwise.

2. For classes of concrete that require air-entrainment, test the trial batch at highest percentage of air (plus 1.5 percent) allowed for that class of concrete.
3. Perform the following testing on each trial batch:
    a. Aggregate gradation for fine and coarse aggregates.
    b. Fly ash testing to verify meeting specified properties, unless fly ash Supplier submits certification by an independent testing laboratory.
    c. Slump.
    d. Where mix is designed to be self-consolidating concrete: slump flow, passing ability, visual stability index, and static segregation.
    e. Air content.
    f. Compressive strength based on three cylinders each tested at seven days and at 28 days.
    g. Shrinkage test in accordance with this Section, for Class "A" concrete and Class "AF" concrete.
4. Submit for each trial batch the following information:
    a. Project identification name and number (if applicable).
    b. Date of test report.
    c. Complete identification of aggregate source of supply.
    d. Tests of aggregates for compliance with the Contract Documents.
    e. Scale weight of each aggregate.
    f. Absorbed water in each aggregate.
    g. Brand, type, and composition of cementitious materials.
    h. Brand, type, and amount of each admixture.
    i. Amounts of water used in trial mixes.
    j. Proportions of each material per cubic yard.
    k. Gross weight and yield per cubic yard of trial mixtures.
    l. Measured slump. Where mix is self-consolidating concrete: measured slump flow, time to reach 20-inch diameter, passing ability, visual stability index, and static segregation.
    m. Measured air content.
    n. Compressive strength developed at seven days and 28 days, from not less than three test cylinders cast for each seven day and 28 day test, and for each design mix.

C. Shrinkage test results where required and as specified in this Section. Report results and averages for original length and at zero, seven, 14, 21, and 28 days of drying.Shrinkage Test:
    1. Perform drying shrinkage tests for trial batch as specified in this Section.
    2. Drying shrinkage specimens shall be four-inch by four-inch by 11-inch prisms with effective gage length of ten inches; fabricated, cured, dried, and measured in accordance with ASTM C157 modified as follows: remove specimens from molds at an age of 23 hours, plus-or-minus one hour, after trial batching; shall be placed immediately in water at 70 degrees F plus-or-minus three degrees F for at least 30 minutes; and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F plus-or-minus three degrees F. Measurement to determine expansion expressed as

percentage of original length shall be made at age of seven days. Length at age of seven days shall be base length for drying shrinkage calculations (zero days drying age). Immediately afterward store specimens in humidity-controlled room maintained at 73 degrees F plus-or-minus three degrees F, and 50 percent (plus-or-minus four percent) relative humidity for remainder of test. Obtain measurements to determine shrinkage expressed as percentage of base length and report measurements separately for seven, 14, 21, and 28 days of drying after seven days of moist curing.

3. Determine drying shrinkage deformation of each specimen as the difference between base length (at zero days drying age) and length after drying at each test age. Determine average drying shrinkage deformation of specimens to nearest 0.0001-inch at each test age. If drying shrinkage of a specimen departs from average of that test age by more than 0.0004-inch, results obtained from that specimen shall be disregarded. Report results of shrinkage test to nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from same concrete used for preparing drying shrinkage specimens. Tests shall be considered part of normal compression tests for the Work. Allowable shrinkage limitations shall be as specified in Part 2 of this Section.

D. Component Supply and Compatibility:

1. Provide a certificate of compatibility for all admixture materials.

E. Sample Panels:

1. Provide Sample panels of wall finishes, each at least 12 inches by 12 inches by three inches thick. Revise Sample panels to produce acceptable finished concrete surfaces.

   a. Provide additional Sample panels as required if original results are unsatisfactory as determined by Engineer.

2. Continuity of color and texture for exposed concrete surfaces is important. Maintain such controls and procedures, in addition to those specified, as necessary to provide continuous match of concrete Work with approved Samples.

F. Mock-up Panels:

1. Provide mock-up panels representative of specified finished surfaces after Sample form panels are approved, at locations on the Site directed by Engineer. Form, reinforce, mix, cast, cure, and finish mock-up panels using selected materials and construction methods proposed for the Work. Provide mock-up panels as follows:

   a. Wall section of L shaped panels, approximately four feet high by three feet each side by eight inches thick and set on an 18-inch wide by eight-inch thick base, unless otherwise shown or indicated. Form faces to represent each specified formed surface finish. Include not less than two form ties, two form panel intersections, one vertical construction joint, and one horizontal construction joint. Construction joints are in Section 03 15 00, Concrete Accessories.

   b. Pan formed section using at least two pan form units. Set units to illustrate method of blending exposed pan joints.

2. Reinforce mock-up panels as required to prevent cracking and to be structurally stable or as shown or indicated; reinforcing steel shall not be less than 0.25 percent of the gross concrete cross section in each direction.

3. Protect mock-up panels from damage and do not remove approved mock-up panels without written Engineer’s permission. Retain and protect mock-ups during construction as a standard for judging completed Work. When directed by Engineer, demolish mock-up panels and remove from the Site

4. Build mock-ups as necessary to achieve Engineer's acceptance of the specified finishes. Owner

will not be responsible for the cost of additional mock-ups required to achieve the specified surface. Demolish rejected mock-ups and remove from Site.

G. Concrete Coordination Conference:

1. Conduct concrete coordination conference to review detailed requirements of Contractor's proposed concrete design mixes, to discuss procedures for producing proper concrete construction, and to clarify roles of the parties involved. Contractor shall organize and schedule the conference, and prepare and distribute to all parties attending conference minutes of the conference.
2. Conduct concrete coordination conference no later than 14 days after the date the Contract Times commence running. Conference shall be held at mutually agreed upon date and time; conference shall be held at the Site unless otherwise mutually agreed upon. Notify all parties to attend concrete coordination conference not less than five days prior to scheduled date of conference.
3. All parties involved in the concrete Work shall attend concrete coordination conference including, but not limited to, the following:
   a. Contractor.
   b. Field testing services representative.
   c. Concrete Subcontractor (if any).
   d. Reinforcing steel Subcontractor (if any) and reinforcing steel Supplier and detailer.
   e. Concrete Supplier.
   f. Admixture manufacturer's representative.
   g. Engineer.
   h. Concrete Special inspector.
   i. Resident Project Representative (if any).

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Submit the following:

1. Shop Drawings:
   a. List of concrete materials and proportions for the proposed concrete mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until this submittal is approved by Engineer.
   b. Laboratory Trial Batch Reports: Submit laboratory test reports for concrete cylinders, materials, and mix design tests.
   c. Test results per ASTM C33 confirming meets limit on deleterious material in fine aggregate.
   d. Test results per ASTM C1260, ASTM C1293, and ASTM C1567 to determine potential for alkali-silica reactivity.
   e. Certificate of compatibility of combined admixtures.
   f. Certification of mix designer.
2. Concrete Supply:

a. Ready-mixed Concrete: Submit the following information.

1) NRMCA plant certification.

2) Physical capacity of mixing plant.

3) Trucking facilities available.

4) Estimated average amount of the specified concrete that can be produced and delivered to the Site during a normal, eight-hour day, excluding output to other customers.

3. Product Data:

a. Manufacturers' specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

4. Samples:

a. Submit Samples of materials as specified and as requested by Engineer. Include with each Sample names of product and Supplier, and description.

5. Curing and Protection Plans:

a. Submit detailed plan for curing concrete in water retaining and non-water retaining structures.

b. Submit detailed plan for curing and protection of concrete placed and cured in cold weather.

1) Submit detailed plan for curing and protection of concrete placed and cured in ambient temperatures over 80 degrees F

C. Informational Submittals:

1. Certifications:

a. Notarized certification of conformance to reference standards used in this Section, when required by Engineer.

b. Flatwork finisher certification.

2. Delivery Tickets: Copies of all delivery tickets for each load of concrete delivered to or mixed at the Site prior to unloading. Each delivery ticket shall contain the information in accordance with ASTM C94 requirements of sections 14.2.1 through 14.2.10 along with project identification name and number (if any), date, mix type, mix time, quantity and amount of water initially withheld and introduced on site.

3. Minutes of the Concrete Coordination Conference and other subsequent structure specific concrete construction conferences.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transportation, Delivery, and Handling:

1. Materials used for concrete shall be clean and free from foreign matter during transportation and handling, and kept separate until measured and placed into concrete mixer.

2. Implement suitable measures during hauling, piling, and handling to ensure that segregation of coarse and fine aggregate particles does not occur and grading is not affected.

B. Storage:

1. For storage, provide bins or platforms with hard, clean surfaces.

PART 2 – PRODUCTS

2.01 CEMENTITIOUS MATERIALS

A. Cement:

1. Portland cement shall be Type II ASTM C150. Type I may be used in lieu of Type II when approved by Engineer.
2. Portland cement shall be produced by manufacturer's facility. Cement from other facilities of the manufacturer shall be tested for similarity of properties. Tested cement with different properties or alternate cement sources of other manufacturers may be used provided that mix design has been approved and acceptable trial batch verifying performance has been made.
3. Do not use cement that has deteriorated because of improper storage or handling.
4. Fly Ash:Fly ash, when used, shall conform to the requirements of ASTM C618 Class F, except as follows:
   a. The loss on ignition shall be a maximum of four percent.
   b. The maximum percent of sulfur trioxide (SO3) shall be 4.0.
5. Fly ash shall be considered a cementitious material.
6. Laboratory trial batches shall be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

B. Slag Cement:

1. Slag Cement, when used, shall conform to ASTM C989, Grade 120.
2. Slag cement shall be considered a cementitious material.
3. Perform laboratory tests on trial batches to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

C. For all classes of concrete, when Type II Cement is used, fly ash or slag cement may be used within the following percentages by weight. When Type I Cement is used, in lieu of Type II Cement, fly ash or slag cement shall be used such that total tricalcium aluminate content (C3A) of the resulting cementitious material is not greater than eight percent.

1. When fly ash is used, material shall have minimum of 20 percent and maximum of 25 percent of total weight of cementitious material.
2. When slag cement is used, material shall have minimum of 40 percent and maximum of 50 percent of total weight of cementitious material.

2.02 AGGREGATES

A. General:

1. Aggregates shall conform to ASTM C33, Class Designation 4S, and as specified in this Section.
2. Do not use aggregates containing soluble salts or other substances, such as iron sulfides, pyrite, marcasite, ochre, or other materials, that can cause stains on exposed concrete surfaces.
3. Aggregates shall be tested to determine potential for alkali-silica reactivity.

B. Fine Aggregate:

1. Provide clean, sharp, natural sand free of loam, clay, lumps, and other deleterious substances.
2. Dune sand, bank run sand, and manufactured sand are unacceptable.

C. Coarse Aggregate:

1. Provide clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
    a. Crushed stone, processed from natural rock or stone.
    b. Washed gravel, either natural or crushed. Slag, pit gravel, and bank run gravel are unacceptable.

2.03 WATER

A. Water used in producing and curing concrete shall be clean and free of injurious quantities of oils, acids, alkalis, organic materials, and other substances that may be deleterious to concrete and steel.

2.04 CONCRETE ADMIXTURES

A. Provide admixtures in accordance with product manufacturer's published instructions. Admixtures shall be compatible with each other. Admixtures shall not contain thiocyanates, shall not contain more than 0.05 percent chloride ion, and shall be non-toxic in the concrete mix after 30 days. Do not use admixtures that have not been incorporated and tested in the accepted mixes, unless otherwise approved by Engineer.

B. Air Entraining Admixtures:
    1. Air entraining admixture shall meet the requirements of ASTM C260.

C. Water-Reducing Admixture: ASTM C494, Type A or D.
    1. Proportion Class "A", Class "AF", and Class "B" concrete with non-air entraining, water-reducing, aqueous solution of modified organic polymer. Admixture shall not contain lignin, nitrates, or chlorides added during manufacturing.

D. High Range Water-Reducing Admixture (HRWR): ASTM C494, Type F or G.
    1. Use high range water reducing admixture in the concrete classifications so specified or indicated. Use of HRWR admixture is allowed at Contractor's option in all other classifications of concrete. Specific admixture formulation shall be as recommended by admixture manufacturer for Project conditions.
    2. Products:
        a. Plastol Series by The Euclid Chemical Company.
        b. Glenium Series by BASF.
        c. Or equal

E. Plasticizing Admixtures: ASTM C1017, Type I or Type II.
    1. Use plasticizing admixture as an alternate to high range water-reducing admixture. Specific admixture formulation shall be as recommended by admixture manufacturer for Project conditions.

F. Viscosity Modifying Admixture
    1. Where necessary to control segregation of self-consolidating concrete, a viscosity modifying admixture shall be combined with a high range water reducing admixture either separately or in a combined admixture. Viscosity modifying and high range water reducing admixtures shall be from the same manufacturer and of the recommended types and dosages needed to produce the required concrete flowability and passing ability without segregation.

G. Set Control Admixtures: In accordance with ASTM C494. Use the following as required:
    1. Type B, Retarding.

2. Type C, Accelerating.
3. Type D, Water reducing and Retarding.
4. Type E, Water reducing and Accelerating.
5. Type F, Water-reducing, high range admixtures.
6. Type G, Water-reducing, high range, and retarding admixtures.

H. Calcium Chloride: Do not use calcium chloride.

I. Shrinkage Reducing Admixture:

1. Shrinkage reducing admixture may be used in mix design when necessary to conform to specified shrinkage limitations, provided that specified strength requirements are complied with and there is no reduction in sulfate resistance in the concrete and no increase in concrete permeability.
2. Products:
   a. Conex or Eucon SRA by The Euclid Chemical Company
   b. MasterLife SRA 20 by BASF Corporation.
   c. Sika Control 40 by Sika Corporation.
   d. Or equal

J. Hydration Controlling Admixture

a. Where extended concrete delivery times are authorized by the ENGINEER, one of the following hydration controlling admixtures shall be used.
b. SikaTard 440, manufactured by Sika Corporation.
c. Eucon DS, manufactured by the Euclid Chemical Company.
d. MasterSet DELVO, manufactured by BASF Corporation.
e. Or equal

K. Crystalline Waterproofing Admixture:

1. Use a cementitious, capillary waterproofing admixture which, when added at the dosage rate of 1% by weight of cement, will permanently fix a non-soluble crystalline structure throughout the capillary voids of the concrete and cause the concrete to become sealed against the penetration of liquids.
2. Product and Manufacturer: Provide one of the following:
   a. Xypex Admix C-500, as manufactured by Xypex Chemical Corporation.
   b. Or equal

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Prepare concrete design mixes in accordance with Table 03 30 00-A:

TABLE 03 30 00-A CONCRETE DESIGN MIX CRITERIA

Concrete Class	Coarse Aggregate[1]		Minimum	Max. W/CM[4]	Slump[2]	Air (%)[6]	Min. Comp Strength[3] (psi)
	Size A	Size B	Cementitious[5] (lbs/cu yd)				
Class "A" Class "AW"	No. 57	No. 8	553	0.42	4" max.	6 +/- 1.5	4,000
Class "AF" Class "AFW"	No. 467	No. 8	517	0.42	4" max.	5 +/- 1.5	4,000
Class "B"	No. 57 or No. 67		517	0.50	4" max.	6 +/- 1.5	3,000
Class "SC"	No. 57	No. 8	535	0.40	Slump flow[7]	6 +/- 1.5	4,000
Class "D"	Any ASTM C33		No requirements				2,000

Notes Applicable to Table 03 30 00-A:

1. Coarse aggregate size numbers refer to ASTM C33. Where Size A and B are designated in Table 03 30 00-A, it is intended that the smaller Size B aggregate is to be added, replacing a portion of the coarse or fine aggregate, in the minimum amount necessary to make a workable and pumpable mix with sand content not exceeding 41 percent of total aggregate.
2. Slumps indicated are prior to addition of high range water reducing admixture or plasticizing admixture.
3. Mix designs shall be made for all but Class "D", which does not require trial batch, so that the compressive strength achieved for laboratory trial batches will not be less than 125 percent of specified design strength.
4. Quantity of water to be used in the determination of water-cementitious materials (W/CM) ratio shall include free water on aggregates in excess of SSD and water portion of admixtures.
5. Minimum cementitious content shall be adjusted in accordance with the requirements of ACI 350.5 and ACI 301 if smaller maximum coarse aggregate size is used.
6. Required air content listed shall be adjusted in accordance with the requirements of ACI 350.5 and ACI 301 for cycles of freezing and thawing if a different maximum coarse aggregate size is used.
7. Class "SC" concrete is self-consolidating concrete. Design mix to meet required plastic properties

B. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, Site conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as approved by Engineer. Before using adjusted concrete mixes, laboratory test data and strength results shall be submitted to and approved by Engineer.

C. Admixtures:

1. Use air-entraining admixture in concrete, unless otherwise shown or indicated. Add air-entraining admixture at admixture manufacturer's prescribed rate to produce concrete at point of placement having air content within prescribed limits.
2. Use water-reducing or high-range water-reducing admixtures in all Class "A", Class "AF", Class "AW", Class "AFW" concrete, and Class SC.
3. Use amounts of admixtures recommended by admixture manufacturer for climatic conditions

prevailing at the Site at time of placing. Adjust quantities and types of admixtures as required to maintain quality.

D. If adding water at the Site is desired, withhold water at the batch plant so that specified water-cement (or cementitious material) ratio is not exceeded. Addition of water shall be in accordance with ASTM C94. After high-range water-reducing admixture is incorporated into the batch, addition of water is not allowed. Additional high-range water reducing admixture may be added at the Site.

E. Slump Limits with High-Range Water Reducer:

1. Slump shall not exceed three inches prior to adding high-range water reducer and shall not exceed nine inches, measured at point of placement, after adding high-range water reducer, except where the mix is designed as self-consolidating concrete.

F. Plastic Properties Required for Self-Consolidating Concrete:

1. Class "SC", self-consolidating concrete, shall have the following plastic properties:

a. Slump flow, as determined by ASTM C1611, shall be 26 inches +/- 2 inches with a visual stability index of 0 or 1 and time to reach 20-inch diameter of 3.5 seconds +/- 1 second.

b. Passing ability of no greater than 1.5-inch difference between slump flow and J-Ring flow as measured by ASTM C1621.

c. Static segregation of less than 5 percent when tested per ASTM C1610.

G. Shrinkage Limitation:

1. Concrete shrinkage for specimens cast in laboratory from trial batch with total water of 30.2 gallons per cubic yard or less, as measured at 21-day drying age and at 28-day drying age shall not exceed 0.035 percent and 0.040 percent, respectively. For trial batch with total water of 32.7 gallons per cubic yard or greater respective limits shall not exceed 0.030 percent and 0.036 percent. Limits in between shall be linear interpolated. Use mix design for construction that complies with trial batch shrinkage requirements. Shrinkage limitations apply to Class "A", Class "AF", Class "AW", and Class "AFW" concrete. Shrinkage limits for Class "SC" concrete shall meet the above requirements with an increase is allowable shrinkage of 0.003 percent for each category.

2. Trial Batch Does Not Comply with Shrinkage Limitation:

a. If trial batch results do not comply with shrinkage limitation specified in the Contract Documents, redesign the mix to reduce shrinkage.

b. After mix has been repeatedly redesigned and Engineer is satisfied that all reasonable means to provide concrete mix that complies with shrinkage requirement have been exercised; and mix design still fails to comply with shrinkage limitation in the Contract Documents, Engineer reserves the right to accept the higher-shrinkage mix, provided that the quantity of shrinkage reinforcing in structures is increased.

c. "Reasonable means" will be construed as reducing the total water content to a maximum of 27 gallons per cubic yard, having the large aggregate blended so that eight percent to 18 percent of combined aggregate is retained on each sieve, using an alternate aggregate source, using a shrinkage reducing admixture, and a combination of these means.

d. Basis for shrinkage reinforcing increase will be proportional to amount that shrinkage value is over the specified shrinkage limitation and will be determined by Engineer. The cost of providing additional shrinkage reinforcement will be paid by the Owner.

2.06 BONDING AGENT

A. Provide epoxy and epoxy-cement bonding agents in accordance with Section 03 15 00, Concrete Accessories.

2.07 CONCRETE CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.

B. Curing Mats: Shall be heavy carpets or cotton mats, quilted at four inches on centers, and weighing minimum of 12 ounces per square yard when dry.

C. Moisture-Retaining Cover: Provide one of the following, complying with ASTM C171:

1. Waterproof paper.
2. Polyethylene film.
3. White burlap polyethylene sheet.
4. Liquid Curing Compound: ASTM C309 Type 1-D (water retention requirements):
5. Provide fugitive dye.
6. Curing compound shall be applied by roller or power sprayer.

2.08 FINISHING AIDS

A. Evaporation Retardant:

1. Product and Manufacturer: Provide one of the following:
   a. Confilm, by Master Builders.
   b. Eucobar, by Euclid Chemical Company.
   c. SikaFilm, by Sika Corporation.
   d. Or equal.

2.09 CRACK INJECTION MATERIALS

A. Structural Crack Repair System:

1. Epoxy for Injection: Low-viscosity, high-modulus moisture insensitive type.
2. Products and Manufacturers: Provide one of the following:
   a. Sikadur 55 SLV or Sikadur 52, and Sikadur 31, Hi-Mod Gel, by Sika Corporation.
   b. Dural 335, by Euclid Chemical Company.
   c. Or equal.

B. Non-structural Crack Repair System:

1. Hydrophobic Polyurethane Chemical Grout:
   a. Provide hydrophobic polyurethane that forms a flexible gasket.
   b. Products and Manufacturers: Provide one of the following:
      1) SikaFix HH LV, by Sika Chemical Company.
      2) Hydro Active Flex SLV, by De Neef Construction Chemicals, Inc.
      3) Or equal.
   c. Shrinkage limit shall not exceed 4.0 percent in accordance with ASTM D1042.
   d. Minimum elongation of 250 percent in accordance with ASTM D3574.
   e. Minimum tensile strength of 150 psi in accordance with ASTM D3574.

2. Hydrophilic Acrylate-Ester Resin:

a. Hydrophilic crack repair system shall be acrylate-ester resin that forms a flexible gasket and increase in volume a minimum of 50 percent when in contact with water.

b. Products and Manufacturers: Provide one of the following:

1) Gelacryl Superflex AR manufactured by DeNeef Corporation.

2) AR870 manufactured by Prime Resins, Inc.

3) Or equal.

2.10 CONCRETE REPAIR MATERIALS

A. Concrete repair mortar shall be pre-packaged, polymer-modified cementitious repair mortar with the following minimum properties:

1. Compressive Strength at One Day: 2,000 psi (ASTM C109).

2. Compressive Strength at 28 Days: 6,000 psi (ASTM C109).

3. Bond Strength at 28 Days: 1,800 psi (ASTM C882 modified).

B. Products and Manufacturers: Provide one of the following:

1. Five Star Structural Concrete, by Five Star Products, Inc. Use formulation recommended by manufacturer for the specific application conditions.

2. SikaTop 122 Plus, SikaTop 123 Plus, SikaTop 111 Plus, or Sikacem 133, by Sika Corporation. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

3. Emaco S88-CA or S66-CR, by Master Builders Inc. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

4. Verticoat, Verticoat Supreme, or Euco SR-VO, by Euclid Chemical Company. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

5. Or equal.

C. Cement Mortar: Shall consist of mix of one part cement to 1.5 parts sand with sufficient water to form trowelable consistency. Minimum compressive strength at 28 days shall be 4,000 psi. Where required to match the color of adjacent concrete surfaces, blend white portland cement with standard portland cement so that, when dry, patching mortar matches the color of surrounding concrete.

2.11 SOURCE QUALITY CONTROL

A. Concrete materials may require testing, as directed by Engineer, at any time during the Work if concrete quality is in question. Provide access to material stockpiles and facilities at all times. Tests shall be done at no expense to Owner.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the substrate and conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 CONCRETE MIXING

A. General:

1. Concrete may be produced at batch plants or by the ready-mixed process. Batch plants shall comply with the requirements of ACI 301 and ACI 350.5 and have sufficient capacity to produce concrete of qualities required and in quantities required to comply with the accepted Progress Schedule. All plant facilities are subject to acceptance of Engineer.
2. Mixing:
    a. Mix concrete with a rotating type batch machine, except where hand mixing of very small quantities is approved by Engineer.
    b. Remove hardened accumulations of cement and concrete from drum and blades to ensure proper mixing action.
    c. Replace mixer blades upon loss of ten percent of mixer blades' original height.

B. Site Mixing:
1. When Site mixing of concrete is approved by Engineer mix all materials for concrete in a drum-type batch mixer.
    a. For mixers of one cubic yard or smaller capacity, continue mixing at least 1.5 minutes but not more than five minutes after all ingredients are in the mixer, before any part of batch is released.
    b. For mixers of capacity larger than one cubic yard, increase minimum 1.5 minutes of mixing time by 15 seconds for each additional cubic yard or fraction thereof.
2. Do not exceed mixer manufacturer's published rating of the mixer, or mixer nameplate capacity, for total volume of materials used per batch.
3. Equip mixer with automatic controls for proportioning materials and proper, measured quantities.
4. Do not exceed 45 minutes total elapsed time between intermingling of damp aggregates and cement to discharge of completed mix.

C. Ready-Mix Concrete:
1. Comply with ASTM C94 and the Contract Documents.
    a. Plant Equipment and Facilities: Conform to requirements of NRMCA certification.
    b. Truck-mixed concrete: Mix concrete in revolving-type truck mixers that are in good condition and produce thoroughly mixed concrete conforming to the Contract Documents. Truck shall operate at agitating speed after mixing is complete or 100 revolutions, whichever occurs first.
    c. Central-Mixed Concrete: Truck shall operate at agitating speed while in transit.
    d. Do not exceed rated capacity of mixer.
    e. Mix concrete for minimum of two minutes after arrival at the Site, or as recommended by mixer manufacturer.
    f. Mix at proper speed until concrete is discharged from mixer.
    g. Maintain adequate facilities at the Site for continuous delivery of concrete at required rates.
    h. Provide access to mixing plant for Engineer upon request.

D. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery to prevent delay of placing concrete after mixing, or holding dry-mixed materials too long in mixer before the adding water and admixtures.

3.03 TRANSPORTING CONCRETE

A. Transport and place concrete not more than 90 minutes after water has been added to the dry ingredients, unless a hydration controlling admixture is authorized by Engineer.

B. Avoid spilling and separation of concrete mixture during transportation.

C. Do not place concrete in which the ingredients have separated.

D. Do not retemper partially set concrete.

E. Use suitable equipment for transporting concrete from mixer to forms.

3.04 PREPARATION FOR CONCRETING

A. Submit to Engineer laboratory trial batch test results for proposed mixes at least 15 days prior to start of Work. Do not begin concrete production until associated laboratory trial batch test result submittal has been approved by Engineer.

B. Notify Engineer a minimum of 24 hours in advance of placing concrete to allow for inspection of form work, joints, waterstops, reinforcement, embedded items, and vapor barriers. The section to be placed shall be fully prepared for concrete placement at the time of notice. Confirm inspection status with Engineer a minimum of 4 hours prior to concrete placement. Do not begin placing concrete until Work is in conformance with the Contract Documents.

C. Subgrade surfaces shall be thoroughly wetted by sprinkling, prior to the placing of concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

D. Reinforcing steel and embedded items shall be completely cleaned of mortar, loose rust, form release compounds, dirt, or other substances which would interfere with proper bonding with concrete. Protective coatings on embedded aluminum items shall continuously cover the surface to be in contact with concrete. Any defects in the coating shall be repaired.

E. Do not place concrete until flow of water entering space to be filled with concrete has been properly stopped or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. Do not deposit concrete underwater, and do not allow water to rise on concrete surfaces until concrete has attained its initial set. Do not allow water to flow over concrete surface in manner and or velocity that will injure concrete surface finish. Provide temporary pumping or other dewatering operations for removing water as required.

F. Prepare joint surfaces in accordance with Section 03 15 00, Concrete Accessories.

3.05 CONCRETE PLACEMENT

A. General:

1. Place concrete continuously, so that no concrete will be placed on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. If section cannot be placed continuously, provide construction joints in accordance with Section

   03 15 00, Concrete Accessories.

2. Deposit concrete as nearly as practical in its final location to avoid segregation due to re-handling or flowing. Do not subject concrete to action that may cause segregation. This requirement does not apply to self-consolidating concrete.

3. Screed concrete that is to receive other construction to proper level to avoid excessive skimming or grouting.

4. Do not use concrete that becomes non-plastic and unworkable, or does not conform to required quality limits, or that has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the Site and dispose of it in conformance with Laws

and Regulations.

5. Do not place concrete until forms, bracing, reinforcing, and embedded items are each in final position and secure.
6. Do not place footings in freezing weather unless adequate precautions are taken against frost action.
7. Do not place footings, piers or pile caps on frozen soil.
8. Unless otherwise instructed, place concrete only when Engineer is present.
9. Allow minimum of three days between adjoining concrete placements. At expansion joints, allow minimum of one day between adjoining concrete placements.

B. Bonding for Next Concrete Pour:

1. Prepare for bonding of fresh concrete to concrete that has set but is not fully cured, as follows:
   a. The surface must be saturated surface dry .
   b. For horizontal surfaces place a six-inch layer of Construction Joint Grout, as specified in Section 03 60 00, Grouting, over the hardened concrete surface.
   c. Place fresh concrete before the grout has attained its initial set.
2. Accomplish bonding of fresh concrete to fully cured, hardened, existing concrete by using a bonding agent as specified in Section 03 15 00, Concrete Accessories.

C. Concrete Conveying:

1. Handle concrete from point of delivery at the Site, transfer to concrete conveying equipment, and transfer to locations of final deposit as rapidly as practical by methods that prevent segregation and loss of concrete mix materials.
2. Provide mechanical equipment for conveying concrete to ensure continuous flow of concrete at delivery end of conveyor. Provide runways for wheeled concrete conveying equipment from concrete delivery point to locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.
3. Do not use chutes for distributing concrete, unless accepted by Engineer.
4. Pumping concrete is allowed, however do not use aluminum pipe for conveying concrete.

D. Placing Concrete into Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 18 inches each and in manner that avoids inclined construction joints. Where placement consists of several layers, place concrete at such rate that concrete being integrated with fresh concrete while still plastic.
2. Do not allow concrete to free-fall within the form from height exceeding four feet. Where high-range water reducer is used to extend slump to at least six inches, maximum allowable free-fall of concrete is six feet. Use “elephant trunks” to prevent free-fall and excessive splashing of concrete on forms and reinforcing. Discontinue free-falls in excess of four feet if there is evidence of segregation.
3. Remove temporary spreaders in forms when concrete placing has reached elevation of such spreaders.
4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidating concrete in accordance with requirements of ACI 301. Vibration of forms and reinforcing is not allowed unless otherwise accepted by Engineer.

5. Where height of concrete placement in walls exceeds 14 feet, provide temporary windows in formwork to facilitate vibration. Properly close temporary windows when height of concrete approaches windows. Determine location, size, and spacing of temporary windows to suit equipment used.
6. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly-spaced locations not farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate the layer of concrete and at least six inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcing and other embedded items without causing segregation of concrete mix.
7. Do not place concrete in beam and slab forms until concrete previously placed in columns and walls is no longer plastic.
8. Prevent voids in the concrete. Force concrete under pipes, sleeves, openings, and inserts from one side until visible from the other side.
9. Self-Consolidating Concrete (SCC) may be used with prior approval of Engineer.

E. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in continuous operation, within limits of construction joints, until placing of a slab panel or section is completed.
2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcing and other embedded items and into corners.
3. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified in this Article for formed concrete structures.
4. Bring slab surfaces to correct elevation and level. Smooth the surface, leaving surface free of humps or hollows. Do not sprinkle water on surface while concrete is plastic. Do not disturb slab surfaces prior to commencing concrete finishing.
5. Where slabs are placed in conditions of high temperature or wind that could lead to formation of plastic shrinkage cracks, provide evaporation retardant applied in accordance with retardant manufacturer's recommendations.

F. Placing Self-Consolidating Concrete

1. Place concrete at a rate in locations such that the surface of placed concrete does not lose flowability and plasticity and newly placed concrete can fully integrate with previously placed fresh concrete.
2. Insert pump hose to the bottom of the form at one end such that concrete does not impact reinforcing steel or the sides of forms. Class "SC" concrete shall not be allowed to free fall into the forms. Allow the concrete to flow laterally to fill the form. Raise pump hose or elephant trunk as the concrete level rises keeping the discharge below the concrete surface taking care to avoid trapping air.
3. Alternately, formwork can be designed to allow pumping of self-consolidating concrete from the bottom of the form.
4. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
5. Prevent voids in the concrete. Force concrete under pipes, sleeves, openings, and inserts from one side until visible from the other side.
6. Do not place concrete in beam and slab forms until concrete previously placed in columns and

walls is no longer plastic.

7. Self-consolidating concrete shall not be vibrated unless there is evidence of incomplete consolidation and when authorized by Engineer.

8. Placement of self-consolidating concrete in slabs shall be as specified in this Article except that vibration is not required.

G. Quality of Concrete Work:

1. Concrete shall be solid, compact, and smooth, and free of laitance, cracks, and cold joints.

2. Concrete for liquid-retaining structures, and concrete in contact with earth, water, or exposed directly to the elements shall be watertight.

3. Cut out and properly replace to extent directed by Engineer, or repair to satisfaction of Engineer, defects as defined in Article 3.12. Thin patches or plastering are unacceptable.

4. Leaks through concrete that exhibit flowing water, and cracks, holes, or other defective concrete in areas of potential leakage, shall be repaired and made watertight.

5. Repair, removal, and replacement of defective concrete as directed by Engineer shall be at no additional cost to Owner.

H. Cold Weather Placing:

1. Protect concrete Work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures, in compliance with ACI 306.1 and the Contract Documents.

2. When air temperature has fallen to or may be expected to fall below 40 degrees F, provide adequate means to maintain temperature in area where concrete is being placed between 50 degrees F and 70 degrees F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain temporary heating and protection as necessary so that ambient temperature does not fall more than 30 degrees F in the 24 hours following the seven-day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing for concrete as required to obtain concrete mixture temperature not less than 55 degrees F and not more than 85 degrees F at point of placement.

4. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Before placing concrete, verify that forms, reinforcing, and adjacent concrete surfaces are entirely free of frost, snow, and ice.

5. Use only specified accelerating admixtures approved for use. Do not use salt or other materials containing antifreeze agents.

I. Hot Weather Placing:

1. When hot weather conditions exist that would impair the quality and strength of concrete, place concrete in compliance with ACI 305.1 and the Contract Documents.

2. When ambient air temperature is at or above 90 degrees F and rising, cool ingredients before mixing concrete to maintain concrete temperature at time of placement below 80 degrees F. When ambient air temperature is at or above 90 degrees F and falling, cool the ingredients before mixing concrete to maintain concrete temperature at time of placement below 85 degrees F. In no case shall the concrete temperature at time of placement exceed 90 degrees F.

3. Mixing water may be chilled, or chopped ice may be used to control concrete temperature provided the water equivalent of ice is calculated in total amount of mixing water. If required, reduce the time from addition of mix water to placement, or use set-retarding admixture.

4. Cover reinforcing materials with water-soaked burlap if ambient air temperature becomes too hot, so that reinforcing material temperature does not exceed ambient air temperature immediately before embedment of reinforcing in concrete.
5. Wet forms thoroughly before placing concrete.
6. Do not place concrete at temperature that causes difficulty from loss of slump, flash set, or cold joints.
7. Use set-control admixtures shall be as approved by Engineer.
8. Obtain Engineer's approval of substitute methods and materials proposed for use.

3.06 FINISHING OF FORMED SURFACES

A. Standard Form Finish:

1. Standard form finish shall be basically smooth and even, but is allowed to have texture imparted by the form material used. Repair defects in accordance with the Contract Documents.
2. Use standard form finish for the following:
   a. Exterior vertical surfaces from foundation up to one foot below grade.
   b. Vertical surfaces not exposed to view.
   c. Other areas shown or indicated.

B. Smooth Form Finish:

1. Produce smooth form finish by selecting form materials that will impart smooth, hard, uniform texture. Arrange panels in orderly and symmetrical manner with minimum of seams. Repair and patch defective areas in accordance with the Contract Documents.
2. Use smooth form finish for the following:
   a. Exterior surfaces exposed to view.
   b. Surfaces to be covered with coating material. Coating material may be applied directly to concrete or may be a covering bonded to concrete such as waterproofing, dampproofing, painting, or other similar system.
   c. Interior vertical surfaces of liquid-containers.
   d. Interior and exterior exposed beams and undersides of slabs.
   e. Surfaces to receive abrasive blasted finish.
   f. Surfaces to receive smooth rubbed or grout cleaned finish.
   g. Other areas shown or indicated.

C. Grout Cleaned Finish:

1. Provide grout cleaned finish to concrete surfaces that have received smooth form finish and where defects have been repaired, as follows:
   a. Combine one part Portland cement to 1.5 parts fine sand by volume, and mix with water to consistency of thick paint. Blend standard Portland cement and white Portland cement, in proportions determined by trial patches, so that final color of dry grout will closely match adjacent concrete surfaces.
   b. Thoroughly wet concrete surface and apply grout uniformly by brushing or spraying immediately to wetted surfaces. Scrub surface with cork float or stone to coat surface and fill surface holes. Remove excess grout by scraping, followed by rubbing with clean burlap

to remove visible grout film. Keep grout damp during setting period by using fog spray on surface for at least 36 hours after final rubbing. Complete each area the same day the area is started, with limits of each area being natural breaks in the finished surface.

2. Use grout cleaned finish for the following:
   a. Interior exposed walls and other vertical surfaces.
   b. Exterior exposed walls and other vertical surfaces down to one foot below grade.
   c. Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.
   d. Interior exposed vertical surfaces of liquid-containing structures down to one foot below normal operating liquid level.
   e. Other areas shown.

D. Related Unformed Surfaces:
1. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise shown or indicated.

3.07 SLAB FINISHES

A. Float Finish:
1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently. Check and level the surface plane to tolerance not exceeding 1/4-inch in ten feet when tested with a ten-foot straightedge placed on surface at not less than two different angles. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.
2. Use float finish for the following:
   a. Interior exposed horizontal surfaces of liquid-containing structures, except those to receive grout topping.
   b. Exterior below-grade horizontal surfaces.
   c. Surfaces to receive additional finishes, except as shown or indicated.

B. Trowel Finish:
1. After floating, begin first trowel finish operation using power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over the surface.
2. Consolidate concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with surface plane tolerance not exceeding 1/8-inch in ten feet when tested with a ten foot straight edge. Grind smooth surface defects that would otherwise project through applied floor covering system.
3. Use trowel finish for the following:
   a. Interior exposed slabs, unless otherwise shown or indicated.
   b. Slabs that receive one of the following: resilient flooring, carpeting, or ceramic tile.

C. Non-Slip Broom Finish:
1. Immediately after float finishing, slightly roughen concrete surface by brooming in direction perpendicular to main traffic route. Use fine fiber-bristle broom, unless otherwise directed by Engineer. Coordinate required final finish with Engineer before applying finish.

2. Use non-slip broom finish for the following:
    a. Exterior exposed horizontal surfaces subject to lightweight foot traffic.
    b. Interior and exterior concrete steps and ramps.

D. Scratched Finish:

1. After providing float finish, roughen concrete surface with rake before concrete's final set. Amplitude of surface shall be minimum of 1/4-inch.
2. Provide scratched finish for the following:
    a. Horizontal surfaces that will receive grout topping or concrete equipment pad.
    b. Surfaces so indicated on the Drawings or elsewhere in the Contract Documents.

3.08 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying, excessive cold or hot temperatures, and maintain without drying at relatively constant temperature for period necessary for hydration of cement and proper hardening of concrete.
2. Start curing after placing and finishing concrete, as soon as free moisture has disappeared from concrete surface. Keep surface continuously moist during entire curing period. Cure for a minimum of 10 days and in accordance with requirements of ACI 301 and ACI 308.1. For concrete sections over 30-inches thick, the curing period shall be for a minimum of 14 days. Avoid rapid drying at end of final curing period.
3. For curing, use water that is free of impurities that could etch or discolor exposed concrete surfaces.
4. Confine water for curing to area being cured.

B. Curing Methods: Curing methods are specified below. Curing methods to be used on each type of concrete surface are specified elsewhere in this Article.

1. Water Curing. Cure by one of the following methods:
    a. Keep concrete surface continuously wet.
    b. Ponding or immersion.
    c. Continuous water-fog spray.
    d. Covering concrete surface with curing mats, thoroughly saturating mats with water, and keeping mats continuously wet with sprinklers or porous hoses. Place curing mats to cover concrete surfaces and edges with four-inch horizontal lap over adjacent mats; provide eight-inch lap over adjacent mats at vertical surfaces. If necessary, weigh down curing cover to maintain contact with concrete surface.
2. Form Curing. Cure by one of the following methods:
    a. Forms shall be maintained and loosened during curing period.
    b. Immediately after forms are loosened or removed, continue with the required curing method as applicable, for remainder of curing period.
    c. Where wood forms are kept in place, apply water to keep forms wet.
3. Moisture Retaining Cover Curing. Cure as follows:
    a. Cover concrete surfaces with the required moisture retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least three inches and

sealed using waterproof tape or adhesive. Immediately repair holes or tears during curing period using cover material and waterproof tape.

4. Liquid Compound Curing. Cure as follows:

a. Unless otherwise approved by Engineer, provide water curing or form curing. Request to use liquid curing compound will be considered by Engineer on case-by-case basis. Construction joints, formed surfaces prior to receiving specified form finish, and concrete to receive surface treatment where surface treatment will be bonded to concrete surface (such as, but not limited to grout fill, hardener, coatings, lining, water repellent, painting, resilient flooring, terrazzo flooring, ceramic tile, quarry tile, chemical resistant coatings, or other applications) shall be water-cured or form-cured.

b. In liquid-retaining structures, provide water curing or form curing, unless other curing method is approved by Engineer. Requests to use liquid curing compound will be considered by Engineer on case-by-case basis. Request shall provide valid construction reason or safety reason for using liquid compound curing including reason why other curing methods are not viable.

c. Apply curing compounds immediately after final finishing or after terminating water curing. Apply curing compound in continuous operation by power spray equipment in accordance with curing compound manufacturer's directions. If areas are subjected to rainfall within three hours after completing curing compound application, area shall be recoated. Maintain coating continuity and repair areas damaged during curing period.

d. When liquid curing compound is used, apply first coat of liquid curing compound at compound manufacturer's recommended coverage rate, and subsequently apply second coat at identical rate, thus providing twice the curing compound manufacturer's recommended coverage.

e. At end of curing period, remove liquid curing compound where required.

C. Formed Surfaces: Use the following curing methods:

1. Walls That Will Retain Liquid or That are Under Ground Surface:

a. If forms are wood, form curing is allowed for entire curing period. If forms are steel, form curing is allowed for maximum of three days after which forms shall be removed so that concrete is free of the forms for remainder of the curing process.

b. Immediately after the forms are loosened or removed, continue with water curing for remainder of curing period.

c. When wall surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed. Before using liquid compound curing, use water curing or form curing for at least the first three days of curing.

2. Formed Slab Underside and Beam Surfaces Where Will Retain Liquid:

a. Form curing is allowed for the full curing period.

b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.

c. When slab surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed.

3. Vertical Joint Surfaces and Surfaces to Receive Surface Treatment:

a. Form curing is allowed for entire curing period.

b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.

4. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.

D. Unformed Surfaces: Treat with one of the following curing methods:

1. Slabs and Mats That Will Retain Liquid or are Below Ground Surface:

a. Water curing.

b. Moisture-retaining cover curing when allowed by Engineer.

c. When slab or mat surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed. Before using liquid compound curing, use water curing or form curing for at least the first three days of curing.

2. Construction Joint Surfaces and Slab and Mat Surfaces to Receive Surface Treatment.

a. Water curing.

b. Moisture-retaining cover curing.

3. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.

E. Temperature of Concrete During Curing:

1. When ambient temperature is 40 degrees F or less, continuously maintain concrete temperature between 50 degrees F and 70 degrees F throughout curing period. When necessary, before concrete placing provide for temporary heating, covering, insulation, or housing as required to continuously maintain specified temperatures and moisture conditions throughout concrete curing period. Provide cold weather protection in accordance with requirements of ACI 306.1.

2. When the ambient temperature is 80 degrees F and above, or during other climatic conditions that would cause too-rapid drying of concrete, before starting concrete placing, provide wind breaks and shading as required, and fog spraying, wet sprinkling, or moisture retaining coverings as required. Continuously protect concrete throughout concrete curing period. Provide hot weather protection in accordance with requirements of ACI 305.1, unless otherwise specified.

3. Maintain concrete temperature as uniformly as possible, and protect from rapid ambient temperature changes. Avoid concrete temperature changes that exceed five degrees F in one hour and 50 degrees F in 24-hour period.

F. Protection:

1. During curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and damage by rain and flowing water. Protect finished concrete surfaces from damage by subsequent construction operations.

3.09 CONCRETE INSTALLATION TOLERANCES

A. Installation Tolerances

1. Concrete placement tolerances, unless otherwise specified in the Contract Documents, shall be in accordance with ACI 117. Tolerances for concrete cover shall be as required by Section 03 20 00, Concrete Reinforcing.

2. Notify Engineer in writing when concrete placement does not conform with required tolerances, as soon as the condition is known to Contractor.

3. When concrete installation does not conform to required tolerances, do not repair or correct by grinding unless specified in the Contract Documents or approved by Engineer in writing.

4. Verification Measurements:

a. If surfaces where tolerances are in question, obtain measurements to verify conformance with tolerances in manner acceptable to Engineer.

b. If surfaces tolerances are in question, cost of obtaining measurements shall be at no additional cost to the Owner.

c. Before obtaining measurements, obtain Engineer's acceptance of method proposed for obtaining measurements.

d. After obtaining measurements, submit measurements to Engineer.

5. Submit with verification measurements submittal proposed method to rectify out-of-tolerance concrete. Do not start repair Work without obtaining Engineer's approval.

3.10 FIELD QUALITY CONTROL

A. Field Testing Services:

1. Owner will employ testing laboratory to perform field quality control testing for concrete. Engineer will direct the testing requirements.

2. Testing laboratory will make standard compression test cylinders and entrained air tests as specified in this Article, under observation of Engineer or Resident Project Representative.

3. Testing laboratory will provide all labor, material, and equipment required for sampling and testing concrete, including: scale, glass tray, cones, rods, molds, air tester, thermometer, and other incidentals required.

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during placement of concrete, as follows:

a. Sampling Fresh Concrete: ASTM C172.

b. Slump: ASTM C143; one test for each concrete load at point of discharge. For Class "SC" concrete, determine slump flow and visual stability index per ASTM C1611, one test for every two concrete loads at point of discharge and when a change in the concrete is observed and determine passing ability per ASTM C1621 when directed by Engineer.

c. Concrete Temperature: ASTM C1064; one for every two concrete loads at point of discharge, and when a change in the concrete is observed. Test each load when time from batching to placement exceeds 75 minutes.

d. Air Content: ASTM C231; one for every two concrete load at point of discharge, and when a change in the concrete is observed.

e. Unit Weight: ASTM C138; one for every two concrete loads at point of discharge, and when a change in the concrete is observed.

f. Compression Test Specimens:

1) In accordance with ASTM C31; make one set of compression cylinders for each 50 cubic yards of concrete, or fraction thereof, of each mix design placed each day. Each set shall be four standard cylinders, unless otherwise directed by Engineer.

2) Cast, store, and cure specimens in accordance with ASTM C31.

3) Test and record the following when cylinders are cast: slump, concrete temperature, air content, and unit weight. For Class "SC" determine slump flow and visual stability index per ASTM C1611 instead of slump.

g. Compressive Strength Tests:

1) In accordance with ASTM C39; one specimen tested at seven days and two specimens tested at 28 days. Test fourth cylinder if needed to verify test results .

2) Adjust mix design if test results are unsatisfactory and resubmit for approval.

3) Concrete that does not comply with strength requirements will be considered as defective Work.

h. Water/Cementitious Materials Ratio: Perform test when required by Engineer in accordance with AASHTO T318.

i. Within 24 hours of completion of test, testing laboratory will submit certified copy of test results to Contractor, concrete producer, and Engineer.

C. Evaluation of Field Quality Control Tests:

1. Do not use concrete delivered to final point of placement having slump, concrete temperature, total air content or unit weight outside specified values.

2. Water/Cementitious Materials Ratio:

a. When water content testing indicates water/cementitious materials ratio to exceed specified requirements by greater than 0.02, remaining batches required to complete concrete placement shall have water content decreased in the mix and water reducing admixture dosage increased as required to bring subsequently-batched concrete within specified water/cementitious materials ratio.

b. Perform additional testing to verify compliance with specified water/cementitious materials ratio.

c. Do not resume concrete production for further concrete placement until Contractor has identified cause of excess water in the mix and revised batching procedures, or adjusted the mix design (and obtained Engineer's associated approval) to bring water/cementitious materials ratio into conformance with the Contract Documents.

3. Compressive Strength:

a. Compressive strength tests for laboratory-cured cylinders will be acceptable if the averages of all sets of three consecutive compressive strength tests results equal or exceed specified 28-day design compressive strength of the associated type or class of concrete, and no individual strength test falls below required compressive strength by more than 500 psi.

b. Questionable Field Conditions During Concrete Placement:

1) Where questionable field conditions exist during concrete placement or immediately thereafter, strength tests of specimens cured under field conditions will be required by Engineer to check adequacy of curing and protecting of concrete placed. Specimens shall be molded at the same time and from the same samples as laboratory-cured specimens.

2) Provide improved means and procedures for protecting concrete when 28-day compressive strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders.

3) When laboratory-cured cylinder strengths are appreciably higher than minimum required compressive strength, field-cured cylinder strengths need not exceed minimum required compressive strength by greater than 500 psi even though the 85 percent criterion may not be met.

4) If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to ensure that load-bearing capacity of the structure is not jeopardized or impaired. If likelihood of low-strength concrete is confirmed and evaluations indicate load-bearing capacity

may have been reduced, perform tests of cores from the concrete in question at Contractor's expense.

c. If compressive strength tests fail to indicate compliance with minimum requirements of the Contract Documents, concrete represented by such tests will be considered defective.

D. Testing Concrete Structure for Strength:

1. When there is evidence that strength of in-place concrete does not comply with the Contract Documents, Contractor shall employ the services of concrete testing laboratory to obtain cores from hardened concrete for compressive strength determination. Cores and tests shall comply with ASTM C42 and the following:

a. Obtain at least three representative cores from each concrete member or suspect area of concrete at locations directed by Engineer.

b. Strength of concrete for each series of cores will be acceptable if average compressive strength is at least 85 percent of specified compressive strength and no single core is less than 75 percent of required 28-day required concrete compressive strength.

c. Testing laboratory shall submit test results to Engineer on same day that tests are completed. Include in test reports Project name and number (if any), date of sampling and testing, Contractor name, name of concrete testing laboratory, exact location of test core in the Work, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength, and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plane of concrete as placed, and moisture condition of the core at time of testing.

2. Fill core holes solid with non-shrink grout in accordance with Section 03 60 00, Grouting, and finish to match adjacent concrete surfaces.

3. If results of core tests are unacceptable or if it is impractical to obtain cores, perform static load test and evaluations complying with ACI 318 and ACI 350, as directed by Engineer.

E. Concrete Tolerance Verification Measurements: Refer to Article 3.9 of this Section.

F. Supplier's Services:

1. Water-Reducing Admixture Manufacturer: Furnish services of qualified concrete technician employed by admixture manufacturer to assist in proportioning concrete for optimum use of admixture. Concrete technician shall advise on proper addition of admixture to concrete and on adjustment of concrete mix proportions to meet changing conditions at the Site.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Temporary Openings:

1. Openings in concrete walls and slabs required for passage of Work are allowed only upon approval of Engineer.

2. Temporary openings made in concrete shall be provided with waterstop in below-ground or liquid-retaining members and structures. Reinforcement going through and around the opening shall be made continuous to provide continuity and shall be approved by the Engineer.

3. Temporary openings that remain in concrete structures shall be filled with the same class of concrete as the adjoining construction, after the Work causing need for temporary opening is complete, unless otherwise shown or directed by Engineer. Mix, place, and cure concrete as specified in this Section to blend with in-place construction. Provide miscellaneous concrete filling shown or required to complete the Work.

B. Bases or Pads for Piping, Panels, and Equipment:

1. Unless specifically shown or indicated otherwise, provide concrete bases or pads for

equipment, floor-mounted panels, and floor-mounted supports for piping and similar construction. Provide all concrete pad and base Work not specifically included under other Sections or other contracts.

2. Dimensions and Elevations:

   a. Coordinate and construct bases and pads to dimensions shown or indicated, or as required to comply with equipment, panel, or piping manufacturer's requirements and elevations indicated on the Drawing.

   b. Unless otherwise shown or indicated, place concrete bases for equipment up to one-inch below the equipment manufacturer's base or mounting plate.

   c. Where specific dimensions or elevations are not shown or indicated, bases and pads shall be six inches thick and extend three inches outside dimensions of the equipment, panel, or supports.

3. Finish: Bases and pads outside of areas to receive non-shrink grout shall have smooth trowel finish, unless special finish such as terrazzo, ceramic tile, quarry tile, or heavy-duty concrete topping is required. In such cases, provide appropriate concrete finish. Surfaces of bases and pads to receive non-shrink grout shall have broom finish.

C. Curbs:

1. Provide monolithic finish to interior curbs by stripping forms while concrete is still green followed by steel-troweling surfaces to hard, dense finish with corners, intersections, and terminations slightly rounded.

2. Exterior curbs shall have rubbed finish for vertical surfaces and broomed finish for top surfaces.

D. Steel Pan Stairs:

1. Provide grout fill for steel pan stair treads, landings, and associated items per the requirements of Section 03 60 00, Grouting.

2. Screed, tamp, and finish concrete surfaces as shown or indicated. Concrete fill surfaces shall receive a non-slip broom finish.

3. Cast into the concrete fill safety inserts and accessories as shown or indicated.

3.12 REPAIR OF CONCRETE PLACED UNDER THIS CONTRACT

A. Repair of Formed Surfaces:

1. Repair the following defects in all formed finishes:

   a. Spalls, air bubbles, rock pockets, form depressions, and other defects that are more than 1/4-inch in depth.

   b. Holes from tie rods and other form tie systems.

   c. Fins, offsets, and other projections that extend more than 1/4-inch beyond designated concrete member surface.

   d. Structural cracks, as defined by Engineer.

   e. Non-structural cracks greater than 0.010-inch wide as defined by Engineer. In liquid-retaining structures, elevated slabs subject to the elements or washdowns, below-grade members, and cracks that evidence leakage. Where it is not possible to verify whether a crack is leaking, repair the crack.

2. Repair the following defects in smooth-finish surfaces, in addition to those listed above in this Section:

   a. Spalls, air bubbles, rock pockets, form depressions, and other defects that extend to more

than 1/2-inch in width in any direction, no matter how deep.

b. Spalls, air bubbles, rock pockets, form depressions, and other defects of any size that exceed three in number in a 12-inch by 12-inch area, or 12 in number in a three-foot by three-foot area.

c. Fins, offsets, and other projections shall be completely removed and smoothed.

d. Scratches and gouges in concrete surface.

e. Texture and color irregularities. In liquid-retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below minimum normal operating liquid surface elevation, except where such defects are indicative of reduced durability.

3. Where smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to finish application, when approved by Engineer.

B. Method of Repair of Formed Surfaces:

1. Immediately after removing forms, repair and patch defective areas with cement mortar or concrete repair mortar as directed by Engineer. Make repairs made to liquid-retaining structures and below-grade surfaces with repair mortar only. Repair form tie holes in liquid-retaining or below-grade surfaces with non-shrink grout in accordance with Section 03 60 00, Grouting.

2. Honeycombs, Rock Pockets, and Holes Left by Tie Rods and Bolts:

a. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to depth less than one-inch for cement mortar and 1/2-inch for repair mortar. Make edges of cuts perpendicular to concrete surface.

b. Before placing cement mortar, thoroughly clean and brush-coat area to be patched with specified bonding agent.

c. When using concrete repair mortar, use of bonding agent is optional; prepare the surface and place mortar in accordance with mortar manufacturer's recommendations.

d. Repairs at exposed-to-view surfaces shall match the color of surrounding concrete, except color matching is not required for interior surfaces of liquid-retaining surfaces up to one foot below typical minimum liquid level. Impart texture to repaired surfaces to match texture of existing adjacent surfaces. Provide test areas at inconspicuous locations to verify mixture, texture, and color match before proceeding with patching.

e. Compact mortar in place and strike off slightly higher than the surrounding surface.

3. Structural Cracks: Pressure-grout structural cracks using injectable epoxy installed using pressurized system. Apply in accordance with epoxy manufacturer's directions and recommendations.

4. Non-structural Cracks: Shall be pressure-grouted using injection material specified in paragraph

2.10. Install in accordance with manufacturer's directions and recommendations.

5. Determination of the crack type shall be made by the Engineer.

6. Holes Through Concrete:

a. Using plunger-type gun or other suitable device, fill holes extending through concrete from least-exposed face, using flush stop held at exposed face; completely fill the hole with specified repair material.

b. At below-grade and liquid-containing members, fill holes with concrete repair mortar and use color-matched cement mortar for outer two inches at exposed-to-view surfaces.

7. Where powerwashing or scrubbing is not adequate, abrasive blast exposed- to-view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 psi.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to specified tolerances for each surface and finish. Correct low and high areas in accordance with this Section.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using template having the required slope. Correct high and low areas in accordance with this Section.

3. Repair finish of unformed surfaces containing defects that adversely affect concrete durability. Surface defects include crazing, cracks in excess of 0.01-inch wide, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

4. Repair structural cracks in all structures and non-structural cracks in liquid-retaining structures. In liquid-retaining structures, where dry face of concrete member can be observed, repair all cracks evidencing any rate of water flow through crack. Where dry face of member cannot be observed, repair all cracks.

D. Methods of Repair of Unformed Surfaces:

1. Correct high areas in unformed surfaces by grinding, after concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

2. Correct low areas in unformed surfaces, during or immediately after completion of surface finishing, by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where repairs are required and concrete has already set, sawcut around perimeter of area to be repaired to depth of 1/2-inch and remove concrete so that minimum thickness of repair is 1/2-inch. Apply specified concrete repair mortar in accordance with repair mortar manufacturer's directions and recommendations.

3. Repair defective areas, except random cracks and single holes not exceeding one-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4-inch clearance all around. Minimum thickness of repair shall be 1.5 inches. Dampen concrete surfaces in contact with patching concrete and brush with specified bonding agent. Place patching concrete while bonding agent is tacky. Mix patching concrete of same materials and proportions to provide concrete of same classification as original, adjacent concrete. Place, compact, and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

4. Repair isolated, random, non-structural cracks (in members that are not below grade or liquid-retaining), and single holes not greater than one-inch diameter, by dry-pack method. Groove top of cracks, and cut out holes to sound concrete, and clean repair area of dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack before cement grout takes its initial set. Mix dry-pack, consisting of one part portland cement to 2.5 parts fine aggregate passing No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for at least 72 hours.

5. Structural cracks shall be pressure-grouted using injectable epoxy. Apply in accordance with epoxy manufacturer's directions and recommendations.

6. Non-structural cracks in below-grade and liquid-retaining structures shall be pressure-grouted using injection material specified in paragraph 2.10.B. Apply in accordance with resin manufacturer's directions and recommendations.

7. Determination of crack type will be by Engineer.

E. Other Methods of Repair:

1. Repair methods not specified in this Section may be used when approved by Engineer.

END OF SECTION

SECTION 033513 – CONCRETE FLOOR SEALER

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Concrete floor sealer.

1.02 RELATED SECTIONS

A. Section 033113 - Cast-in-Place Concrete.

1.03 SUBMITTALS

A. Comply with Section 013200 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.

C. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name.

B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use. Keep away from ignition sources. Do not allow to freeze.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not apply sealer when air or surface temperature is below 55 degrees F

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Kemiko Concrete Products

B. Approved equal

2.02 CONCRETE FLOOR SEALER

A. Concrete Floor Sealer: Kemiko Stone Tone Sealer.

1. Acrylic water-based urethane clear sealer.
2. Solids Content: 30 percent.
3. Nonyellowing.
4. Resistant to blush.
5. Satin finish.
6. VOC compliant.
7. Quick drying.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive sealer. Notify Architect if surfaces are not acceptable.

B. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Prepare concrete surface in accordance with manufacturer's instructions.

B. Concrete shall be as specified in Section 03300. Ensure concrete is a minimum of 28 days old.

C. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.

3.03 APPLICATION

A. Apply sealer in accordance with manufacturer's instructions at locations indicated on the drawings.

B. Do not dilute sealer.

C. Apply sealer in a thin uniform film.

D. Apply second coat of sealer if required by manufacturer's instructions. Apply second coat after first coat is dry.

E. Keep sealer film build-up to a minimum.

F. Keep material containers closed when not in use to avoid contamination.

3.04 PROTECTION

A. Protect concrete surfaces from foot traffic for a minimum of 24 hours.

B. Avoid washing concrete surfaces for a minimum of 48 hours.

END OF SECTION 033513

SECTION 03 60 00 – GROUTING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install grout and perform grouting Work.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before grouting Work.

C. Related Sections:

1. Section 03 15 00 - Concrete Accessories.
2. Section 03 30 00 - Cast-In-Place Concrete.

D. Application and Grout Material:

1. The following is a listing of grouting applications and the corresponding type of grout material to be provided for the associated application. Unless shown or indicated otherwise in the Contract Documents, provide grout in accordance with the following:

TABLE 03 60 00-A, GROUT APPLICATIONS AND MATERIAL TYPES

Application	Required Grout Material Type
Beam and column base plates and precast concrete bearing less than 16 inches in the least dimension	Class II Non-Shrink
Base plates for non-motorized equipment, and motorized equipment or machinery less than 50 horsepower	Class I Non-Shrink (unless otherwise recommended by equipment manufacturer)
Motorized equipment or machinery equal to and greater than 50 horsepower, and motorized equipment or machinery equipment less than 50 horsepower subject to severe shock loads or high vibration	Class III Non-Shrink Epoxy (unless otherwise recommended by equipment manufacturer)
Filling blockout spaces for embedded items such as railing posts, guide frames for hydraulic gates, and similar applications	Class II Non-Shrink (Class I where placement time exceeds 15 minutes)
Grout fill or grout toppings less than four inches thick	Grout Fill
Grout fill greater than four inches thick	Class "B" Concrete in accordance with Section 03 30 00, Cast-In-Place Concrete
Applications not listed above, where grout is indicated on the Drawings	Class I Non-Shrink, unless shown or indicated otherwise

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 211.1, Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. ACI 301, Structural Concrete for Buildings.

3. ASTM C33/C33M, Specification for Concrete Aggregates.
4. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
5. ASTM C230/C230M, Specification for Flow Table for Use in Tests of Hydraulic Cement.
6. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
7. ASTM C579, Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
8. ASTM C827, Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
9. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
10. ASTM C939, Text Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
11. ASTM C1107/C1107M, Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
12. ASTM C1181, Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Grout Testing Laboratory:
    a. Independent testing laboratory employed for design and testing of grout materials and mixes shall comply with testing laboratory requirements in Section 03 30 00, Cast-in-Place Concrete and other applicable requirements in the Contract Documents.
2. Manufacturer: Shall have a minimum of five years' experience of producing products substantially similar to that required and shall be able to submit documentation of at least five satisfactory installations that have been in successful operation for at least five years each.
3. Manufacturer's Field Service Technician: When required, provide services of manufacturer's full-time employee, factory-trained in handling, use, and installing the products required, with at least five years of experience in field applications of the products required.

B. Trial Batch:

1. Each grout fill and construction joint grout mix proportion and design shall be verified by laboratory trial batch or field experience methods. Comply with ACI 211.1 and submit to Engineer a report with the following data:
    a. Complete identification of aggregate source of supply.
    b. Tests of aggregates for compliance with specified requirements.
    c. Scale weight of each aggregate.
    d. Absorbed water in each aggregate.
    e. Brand, type, and composition of cement.
    f. Brand, type, and amount of each admixture.
    g. Amounts of water used in trial mixes.
    h. Proportions of each material per cubic yard.

i. Unit weight and yield per cubic yard of trial mixtures.

j. Measured slump.

k. Measured air content.

l. Compressive strength developed at seven days and 28 days, from not less than three test specimens cast for each seven-day and 28-day test, and for each design mix.

2. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301.

3. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301.

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Submit the following:

1. Shop Drawings:

a. Schedule of Project-specific grout applications, installation locations, and the grout type proposed for each.

b. List of grout materials and proportions for the proposed mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until submittal is approved by Engineer.

c. Trial Batch Reports: Submit laboratory test reports for grout materials and mix design tests.

2. Product Data:

a. Data sheets, certifications, and manufacturer's specifications for all materials proposed for use.

3. Manufacturer’s Instructions:

a. Special instructions for shipping, storing, protecting, and handling.

b. Installation instructions for the materials.

4. Field Quality Control Submittals:

a. Report field testing results for each required time period. (e.g., seven-day tests, 28-day tests). Submit within 24 hours after completion of associated test. Each test report shall include results of all testing required at time of sampling.

5. Supplier Reports:

a. Submit written report of results of each visit to Site by Supplier’s field service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

6. Qualifications Statements:

a. Testing laboratory, when not submitted under other Sections.

b. Manufacturer, when submittal of qualifications is required by Engineer.

c. Manufacturer's field service technician, when submittal of qualifications is required by Engineer.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Conform to Section 01 60 00, Product Requirements, and this Section

B. Storage of Materials: Store grout materials in a dry location, protected from weather and protected from moisture.

PART 2 – PRODUCTS

2.01 NON-SHRINK GROUT MATERIALS

A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or container in which the materials are packaged. Specific formulation for each type or class of non-shrink grout specified in this Section shall be that recommended by the grout manufacturer for the particular application.

B. Class I Non-Shrink Grout:

1. Class I non-shrink grouts shall have a minimum 28-day compressive strength of 7,000 psi. Use grout for precision grouting and where water-tightness and non-shrink reliability in both plastic and hardened states is critical, in accordance with Table 03 60 00-A in this Section.

2. Products and Manufacturer: Provide one of the following:

a. MasterFlow 928, by BASF, Inc.

b. Five Star Grout, by Five Star Products, Inc.

c. Hi-Flow Grout, by Euclid Chemical Company.

d. Or equal.

3. Comply with ASTM C1107/C1107M, Grade C and B (as modified below) when tested using amount of water required to achieve the following properties:

a. Fluid consistency (20 to 30 seconds) shall be in accordance with ASTM C939.

b. At temperatures of 45, 73.4, and 95 degrees F.

4. Length change from placing to time of final set shall not have shrinkage greater than the expansion measured at three or fourteen days. Expansion at three or fourteen days shall not exceed the 28-day expansion.

5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.

6. Fluid grout shall pass through the flow cone, with continuous flow, one hour after mixing.

C. Class II Non-Shrink Grout:

1. Class II non-shrink grouts shall have minimum 28-day compressive strength of 7,000 psi. Use grout for general-purpose grouting applications in accordance with Table 03 60 00-A in this Section.

2. Products and Manufacturer: Provide one of the following:

a. MasterFlow 100, by BASF, Inc.

b. EZ-Cure Contractor’s Grout, by Five Star Products, Inc.

c. NS Grout, by Euclid Chemical Company.

d. Or equal.

3. Comply with ASTM C1107/C1107M and the following when tested using the quantity of water required to achieve the following properties:

a. Flowable consistency (140 percent flow in accordance with ASTM C230/C230M, five drops in 30 seconds).

b. Fluid working time of at least 15 minutes.

c. Flowable for at least 30 minutes.

4. When tested, grout shall not bleed at maximum allowed water.

5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.

D. Class III Non-Shrink Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100-percent solids system.

2. Products and Manufacturer: Provide one of the following:

a. E3 Flowable, by Euclid Chemical Company.

b. Sikadur 42 Grout Pak, by Sika Corporation.

c. HP Epoxy Grout, by Five Star Products, Inc.

d. Or equal.

3. Epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all pre-measured and prepackaged. Resin component shall not contain non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are unacceptable. Variation of component ratios is not allowed without specific recommendation by manufacturer. Manufacturer's instructions shall be printed on each container in which products are packaged.

4. The following properties shall be attained with the minimum quantity of aggregate allowed by epoxy grout manufacturer.

a. Vertical volume change at all times before hardening shall be between zero percent shrinkage and 4.0 percent expansion when measured in accordance with ASTM C827 (modified for epoxy grouts by using an indicator ball with specific gravity between 0.9 and 1.1).

b. Length change after hardening shall be less than 0.0006-inch per inch and coefficient of thermal expansion shall be less than 0.00003-inch per inch per degree F when tested in accordance with ASTM C531.

c. Compressive creep at one year shall be less than 0.001-inch per inch when tested under a 400-psi constant load at 140 degrees F in accordance with ASTM C1181.

d. Minimum seven-day compressive strength shall be 14,000 psi when tested in accordance with ASTM C579

e. Grout shall be capable of maintaining at least a flowable consistency for minimum of 30 minutes at 70 degrees F.

f. Shear bond strength to portland cement concrete shall be greater than shear strength of concrete when tested in accordance with ASTM C882/C882M.

g. Minimum effective bearing area shall be 95 percent.

2.02 GROUT MATERIALS OTHER THAN NON-SHRINK GROUT

A. General: Materials for grouts (other than non-shrink grouts) shall be in accordance with Section 03 30 00 - Cast-In-Place Concrete, except as otherwise specified in this Section.

B. Grout Fill:

1. Grout fill shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed in accordance with this Section.

a. Minimum Compressive Strength: 4,000 psi at 28 days.

b. Maximum Water-Cement Ratio: 0.45 by weight.

c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.

d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.

e. Air Content: Seven percent (plus or minus one percent).

f. Minimum Cement Content: 564 pounds per cubic yard.

g. Slump for grout fill shall be adjusted to match placing and finishing conditions, and shall not exceed four inches.

C. Construction Joint Grout:

1. Construction joint grout shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned with similar cementitious characteristics as Class “A” concrete specified in Section 03 30 00, Cast-In-Place Concrete. Mix design shall result in grout that is flowable with high mortar content. Mix requirements are:

a. Minimum Compressive Strength: 4,500 psi at 28 days.

b. Maximum Water-Cement Ratio: 0.42 by weight.

c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.

d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.

e. Air Content: Seven percent (plus or minus one percent).

f. Minimum Cement Content: 752 pounds per cubic yard.

g. Slump for Construction Joint Grout: Seven inches (plus or minute one inch).

2.03 CURING MATERIALS

A. Curing materials shall comply with Section 03 30 00, Cast-in-Place Concrete, and shall be as recommended by the manufacturer of prepackaged grouts.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine substrate and conditions under which grouting will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Place grout as shown and indicated, and in accordance with Laws and Regulations and grout manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, obtain clarification or interpretation from Engineer before proceeding.

2. Consistency of non-shrink grouts shall be as required to completely fill the space to be grouted for the particular application. Do not install grout for dry-packing without approval of Engineer. When dry-packing is approved by Engineer, dry-pack consistency shall be such that grout has sufficient water to ensure hydration and grout strength development, and remains plastic, moldable, and that does not flow.

3. Grouting shall comply with temperature and weather limitations in Section 03 30 00, Cast-In-Place Concrete.

4. Cure grout in accordance with grout manufacturer’s instructions for prepackaged grout and Section 03 30 00, Cast-In-Place Concrete, for grout fill.

B. Columns and Beams:

1. After shimming columns and beams to proper elevation, securely tighten anchors. Properly form around base plates allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with non-shrink grout.

C. Equipment Bases:

1. Install equipment in accordance to manufacturer's recommendations, Laws, and Regulations, and the Contract Documents. After shimming equipment to proper elevation, securely tighten anchors. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of equipment base and top of concrete base to ensure that voids are completely filled with non-shrink grout.

D. Construction Joints:

1. Place a six-inch minimum thick layer of construction joint grout over contact surface of concrete at interface of horizontal construction joints in accordance with Section 03 15 00, Concrete Accessories, and Section 03 30 00, Cast-In-Place Concrete.

E. Grout Fill:

1. All mechanical, electrical, and finish work shall be completed prior to placing grout fill. Base slab shall be provided with a scratched finish in accordance with Section 03 30 00, Cast-In-Place Concrete. Roughen existing slabs shall by abrasive blasting or hydroblasting exposing aggregates to ensure bonding to base slab.

2. Minimum thickness of grout fill shall be one-inch. Where finished surface of grout fill is to form an intersecting angle of less than 45 degrees with concrete surface against which grout will be placed, form a key in the concrete surface at the intersection point. Key shall be minimum of

   3.5 inches wide by 1.5 inches deep.

3. Thoroughly clean and wet base slab prior to placing grout fill. Do not place grout fill until slab is completely free of standing water. A thin coat of neat Type II cement slurry shall be broomed into surface of slab. Place grout fill while slurry is wet. Grout fill shall be compacted by rolling or tamping, brought to elevation, and floated. In tanks and basins where scraping-type equipment will be installed, grout fill shall be screeded by blades attached to revolving mechanism of equipment in accordance with procedures recommended by equipment manufacturer after grout is brought to elevation.

4. Grout fill placed on sloping slabs shall be installed uniformly from bottom of slab to top, for full width of placement.

5. Test grout fill surface with a straight edge to detect high and low spots; immediately correct high and low spots in grout fill. When grout fill has hardened sufficiently, grout fill shall be steel troweled to provide a smooth surface free of bug holes and other imperfections. While an acceptable type of mechanical trowel may be used in this operation, the last pass over the

   grout fill surface shall be by hand-troweling. During finishing, do not apply the following to the grout fill surface: water, dry cement, or mixture of dry cement and sand.

6. Cure and protect grout fill in accordance with Section 03 30 00, Cast-In-Place Concrete.

3.03 FIELD QUALITY CONTROL

A. Field Testing Services:

1. Owner will employ testing laboratory to perform field quality control testing for grout. Engineer will direct the testing requirements.

2. Contractor shall provide all curing and necessary cube storage.

B. Quality Control Testing During Construction:

1. Grout Fill: Perform sampling and testing for field quality control during grout fill placing as follows:

a. Sampling Fresh Grout Fill: ASTM C172.

b. Slump: ASTM C143; one test for each load of grout at point of discharge.

c. Air Content: ASTM C231; one sample for every two grout loads at point of discharge, and when a change in the grout is observed.

d. Compression Test Specimens:

1) In accordance with ASTM C109/C109M; make one set of compression cubes for each 50 cubic yards of grout, or fraction thereof, of each mix design placed each day. Each set shall be four standard cubes, unless otherwise directed by Engineer.

2. Non-shrink Grout: Perform sampling and testing for field quality control during non-shrink grout placing as follows:

a. Perform compression testing of non-shrink grout in accordance to ASTM C109/C109M at intervals during construction as selected by Engineer. Make a set of four specimens for testing compressive strength at a period of time selected by the Engineer.

b. Perform compression tests on epoxy grout and fabricate specimens for epoxy grout testing in accordance with ASTM C579, Method B, at intervals during construction as selected by the Engineer. Make a set of four specimens for testing compressive strength at a period of time selected by Engineer.

C. Evaluation of Field Quality Control Tests:

1. Do not use grout, delivered to final point of placement, having slump or total air content that does not comply with the Contract Documents.

2. Compressive strength tests for laboratory-cured cubes will be acceptable if averages of all sets of three consecutive compressive strength test results equal or exceed the required 28-day design compressive strength of the associated type of grout.

3. If the compressive strength tests do not comply with the requirements in the Contract Documents, the grout represented by such tests will be considered defective and shall be removed and replaced, or subject to other action required by Engineer, at Contractor's expense.

D. Manufacturer's Services:

1. Manufacturers of proprietary materials shall make available upon 72 hours notification the services of qualified, full time employee, experienced in serving as a field service technician for the products required, to aid in assuring proper use of products under the actual conditions at the Site.

END OF
SECTION

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SECTION 04 01 00 – MAINTENANCE OF MASONRY

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes water cleaning of repaired brick surfaces; replacement of brick face unit; repointing mortar joints; and repair of damaged masonry.

B. Related Sections:

1. Section 04 05 03 – Masonry Mortaring & Grouting
2. Section 04 05 23 – Masonry Accessories
3. Section 04 20 00 – Unit Masonry
4. Section 07 90 00 - Joint Protection.

1.02 UNIT – PRICE MEASUREMENT AND PAYMENT

A. Face Brick Repointing:

1. Basis of Measurement: By the square foot area of exposed brick face.
2. Basis of Payment: Includes investigation of existing masonry with Engineer, removal repointing of existing brick and concrete masonry unit joints. Work includes removing unsound mortar from joints, removal of material, dust control, repointing joints and cleaning masonry and surrounding areas affected by work. Unit price for payment of “Repointing Masonry Joints” shall be as shown on the completed Bid Form.
3. Square foot of repointing includes all horizontal and vertical joints within the area designated for repointing.

B. Brick Replacement:

1. Basis of Measurement: Per each brick replaced.
2. Basis of Payment: Includes investigation of existing masonry with Engineer, removing mortar and brick, cleaning joint spaces, installing ties to substrate as necessary, furnishing and installing new brick, finishing mortar joints and cleaning masonry and surrounding areas affected by work. Per each brick replacement is not intended for areas that are being rebuilt adjacent to windows or planned transitions as shown on the Contract Drawings. Unit price for payment of “Brick Replacement” shall be as shown on the completed Bid Form.

1.03 REFERENCES

A. American Concrete Institute:

1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

1.04 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Samples: Submit four samples of face brick units to match existing when replacement bricks are required to replace broken bricks.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1 requirements.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.

C. Store mortar ingredients in manufacturer's packaging, or when delivered loose, with adequate weatherproof covering.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

B. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

1.09 SEQUENCING

A. Section 01 10 00 – Summary of the Work.

B. Perform repointing before cleaning masonry surfaces.

1.10 SCHEDULING

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 – PRODUCTS

2.01 MORTAR MATERIALS

A. Mortar materials shall conform to ASTM C270, type S. Match existing mortar in color, texture, and joint shape.

1. Cement: Use one brand of cement throughout the work. Portland cement shall conform to ASTM Cl50, Type I.

2. Hydrated Lime: Hydrated lime shall conform to ASTM C207, Type S.

3. Admixtures: No salt, anti freeze liquid, accelerator, or other admixture will be permitted without the written approval of the E/A.
4. Sand: Sand shall conform to ASTM Cl44; except that sand for mortar in joints l/4 inch or less shall pass a No. 16 sieve. Sand containing any substance which will stain the masonry shall not be used.

B. Clay Brick: Minimum compressive strength of 3000 psi on gross area. Color and texture shall match existing.

C. Concrete Masonry Units: In accordance with ASTM C90, grade N, with a minimum compressive strength of 2800 psi. Match existing where replacement is necessary.

D. Joint reinforcement shall be made of cold drawn wire and shall conform to ASTM A82. Wire shall be hot-dipped galvanized according to ASTM A153 (1.5 oz/sq ft). Wire thickness shall be 9 gauge.

E. Ties shall be galvanized.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify surfaces to be restored are ready for work of this section. Examine areas indicated on Drawings with Engineer to determine extent of work to be performed.

3.02 PREPARATION

A. Protect elements surrounding work of this section from damage or disfiguration.

B. Immediately remove stains, efflorescence, or other excess resulting from work of this section.

C. Carefully remove and store fixtures, fittings, finishing hardware, and accessories.

D. Close off areas and surfaces not receiving work of this section to protect from damage.

E. Construct dust proof partitions to close off occupied areas if interior work is necessary.

3.03 INSTALLATION

A. Project Conditions

1. Do not perform any exterior masonry work unless air temperatures are between 40 and 85 degrees Fahrenheit and will remain so for at least 48 hours after completion of work unless proper protection is provided.
2. Provide sun, wind and rain protection.

B. Rebuilding:

1. Cut out damaged and deteriorated masonry with care in manner to prevent damage to adjacent remaining materials.
2. Support structure in advance of cutting out units to maintain stability of remaining materials.

3. Cut away loose or unsound adjoining masonry and mortar as directed by Engineer to provide firm and solid bearing for new work.
4. Build in new masonry units to match existing work.
    a. Lay hollow masonry units with face shell bedding on head and bed joints.
    b. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
    c. Remove excess mortar as Work progresses.
    d. Interlock intersections and external corners.
    e. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
    f. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
    g. Install horizontal joint reinforcement spaced at maximum 16 inches oc or as shown on the drawings.
5. Mortar Mix: Colored and proportioned to match existing work.
6. Ensure anchors, ties, reinforcing, and flashings are correctly located and built in.
7. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in openings, accessories and fittings.

C. Repointing:
1. Unless directed otherwise, areas to be repointed are limited to existing deteriorated or cracked joints and areas adjacent to brick face areas to be rebuilt for providing an integrated appearance between rebuilt work and existing masonry surfaces. Only repoint areas as directed by the Engineer.
2. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.
3. Utilize hand tools. Power tools may be used only after test cuts determine no damage to masonry units results.
4. Do not damage masonry units.
5. When cutting is complete, remove dust and loose material by brushing with air jet.
6. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch maximum layers. Form smooth, compact joint to match existing.
7. Moist cure for a minimum of 72 hours. Spray a mist of water over brick surface a minimum of 3 times per day. On days exceeding 80 degrees Fahrenheit, increase frequency of spraying. Use plastic sheeting to retain moisture as conditions warrant to retain moisture.

D. Cleaning New Masonry:
1. Verify mortar is fully set and cured.
2. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
3. Scrub walls with detergent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.

E. Aging:
1. Rub in or dust new masonry work to match, as close as possible, adjacent original work.

2. Use carbon black in small amounts, rubbing in well.
3. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.
4. Repeat process up to two additional times as directed by Engineer.

3.04 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. As work proceeds and on completion, remove excess mortar, smears, droppings.

C. Clean surrounding surfaces.

END OF SECTION

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SECTION 04 05 03 – MASONRY MORTARING AND GROUTING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Mortar and masonry grout materials.

B. Mixing mortars and masonry grouts.

1.02 RELATED SECTIONS

A. Concrete – Division 03.

1.03 SUBMITTALS

A. Samples: Submit samples of mortar materials as requested by the Engineer in compliance with Division 01.

PART 2 – PRODUCTS

2.01 MORTAR

A. Mortar for new work to match existing construction shall be selected for appearance to match existing mortar and shall be approved by the Engineer.

2.02 MATERIALS

A. Cement: Use one brand of cement throughout the work. Portland cement shall conform to ASTM Cl50, Type I.

B. Hydrated Lime: Hydrated lime shall conform to ASTM C207, Type S.

C. Admixtures: No salt, anti freeze liquid, accelerator, or other admixture will be permitted without the written approval of the E/A.

D. Sand: Sand shall conform to ASTM Cl44; except that sand for mortar in joints l/4 inch or less shall pass a No. 16 sieve. Sand containing any substance which will stain the masonry shall not be used.

E. Coarse Aggregate: Coarse aggregate for masonry grout shall conform to ASTM C404. Aggregate containing any substance which will stain the masonry shall not be used.

F. Water: Water shall be clean and potable.

2.03 MORTAR

A. Proportions: Mortar shall be in accordance with ASTM C270, Type S.

B. Strength: The compressive strength of mortar cube specimens shall be determined in accordance with ASTM C91 using the same materials and proportions that will be used for the mortar in the construction. Mortar shall have an average compressive strength at 28 days as follows:

1. Type S 1800 psi

C. Application: Use Type S mortar for all masonry walls.

2.04 MASONRY GROUT

A. Coarse grout for filling cells in masonry units shall be proportioned in accordance with ASTM C476 and shall have a minimum compressive strength of 2000 psi.

B. Fine grout for bedding and grouting structural steel shall be per Division 03.

PART 3 – EXECUTION

3.01 GENERAL

A. Equipment for mixing mortar and grout shall be clean and free of hardened mortar, dirt and foreign matter.

B. Mix all mortar and masonry grout in a mechanical batch mixer for a minimum of 5 minutes after all materials have been added. Mortar and masonry grout shall be used within 1-1/2 hours at temperatures over 80°F and within 2-1/2 hours at temperatures below 80°F.

3.02 MORTAR

A. Adjust the consistency of the mortar to the satisfaction of the mason but add only as much water as needed to make a workable mortar. If the mortar begins to stiffen from evaporation or from absorption of a part of the mixing water, re-temper by adding water and remix the mortar. Do not use mortar after it has begun to set.

3.03 MASONRY GROUT

A. Mix all masonry grout in accordance with ASTM C476. Masonry grout shall have a consistency at time of placement to yield a slump as required to facilitate placement and appropriate for the absorption of the masonry units.

END OF SECTION

SECTION 04 05 23 – MASONRY ACCESSORIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Masonry reinforcement, anchors, and ties.

B. Control and expansion joints.

C. Bonding and anchorage.

D. Rigid cavity insulation.

E. Concrete block core insulation.

1.02 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

B. Samples: Submit samples of materials as requested by Engineer.

C. Shop Drawings: Submit shop drawings showing all reinforcing bars and details in masonry walls according to Section 03 20 00 Concrete Reinforcement.

PART 2 – PRODUCTS

2.01 REINFORCEMENT BARS:

A. Reinforcement bars for walls, bond beams, and other masonry reinforcement shall conform to ASTM A615, Grade 60.

2.02 JOINT REINFORCEMENT:

A. Joint reinforcement shall be prefabricated from cold drawn steel wire. Joint reinforcement shall be galvanized in accordance with ACI 530.1. Side wires shall be 9 gauge deformed wire; truss rods shall be 9 gage smooth or deformed wire, welded to side wires in the same plane at 16 inch centers. Provide prefabricated pieces for corners and intersections of walls. Joint reinforcement shall be two wire or three wire type as applicable. Reinforcement shall be ladder type approximately 2 inches narrower than the nominal thickness of the wall or partition.

2.03 RIGID STEEL ANCHORS

A. Rigid steel anchors shall be a minimum of 1 1/4" x 1/4" x 30" long with each end turned up 3". Anchors shall be stainless steel.

2.04 RIGID CAVITY INSULATION

A. Cavity insulation shall be ThermaDrain with Super Tuff-R/Thermax (Polyisocyanurate) Insulated Drainage System or equivalent approved product combining and integrated rigid foam insulation and drainage system for cavity construction. The insulation thickness shall be as shown on the drawings.

1. Polyisocyanurate Board Insulation: Rigid cellular foam with an integral drainage panel, complying with ASTM C 1289; Type I, aluminum foil both faces; Class 2, glass fiber-reinforced core.

2. Flame Spread Index: 75 or less, when tested in accordance with ASTM E 84.

3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.

4. Thermal Resistance: R-value of 13.

5. Manufacturer: ThermaDrain, South Elgin ,Il. 800-837-4065.concrete bock core insulation

2.05 CONCRETE BLOCK CORE INSULATION

A. Ungrouted core fill shall be perlite loose fill insulation treated with water repellent. The insulation material shall conform to the requirements of ASTM C549. The product shall conform to the Standard Specifications for Loose Perlite Fill Insulation as adopted and published by Perlite Institute, Inc.

2.06 NYLON ROPE

A. Nylon rope for weep holes shall be 3/8" diameter by 12" long. Space and locate as specified or as indicated on the Drawings.

2.07 SEALS AND GASKETS FOR CONTROL JOINTS

A. Seals and gaskets for control joints shall be of closed cell natural or synthetic rubber. Provide seals and gaskets of indicated shapes and in locations as specified or indicated on Drawings. Seals and gaskets shall be resistant to oils and solvents and shall be flexible after being exposed to temperature of minus 40 degrees F. At vertical joints provide 3/8" x 3" deep expansion joint with sealant over.

2.08 DOVETAIL ANCHOR SLOTS

A. Slots for dovetail anchors shall be 1" deep x 1" wide x 5/8" throat and shall be of 26 gage stainless steel or as shown on the Drawings. Slots shall be foam filled to prevent filling with concrete. Furnish staples and end caps.

2.09 DOVETAIL ANCHORS

A. Dovetail anchors for anchoring masonry to steel shall be compatible with anchor slots. Anchors shall be 12 gage stainless steel or as shown on the Drawings with corrugated ends 7-1/2" long, and with moisture drip.

2.10 CHANNEL SLOT ANCHORS

A. Anchors to be 16 GA. stainless steel 1-1/4" wide x 20" long.

B. Channel slot to be 12 gauge galvanized steel 1-3/8" wide with 1/2" flange, continuous length.

2.11 MESH TIES

A. 1/2" x 16 gauge galvanized wire.

PART 3 EXECUTION

3.1 Ol.JOINT REINFORCEMENT

A. Install horizontal continuous joint reinforcement in all unit masonry walls, backups, and partitions. Reinforcement shall start not more than 8 inches above the masonry supporting surface and end within the top full mortar joint, or as indicated on the Drawings, and shall be spaced at maximum 16 inch centers vertically.

B. Reinforcement shall be placed in the first three mortar joints above lintels and below openings. Extend the reinforcement at least 24 inches past jambs. In addition, provide wire ties alternating with reinforcement 16 inches on centers vertically and within 12 inches of opening jambs, where face brick occurs, if any.

C. Reinforcement shall be continuous but shall not pass through vertical masonry expansion or control joints unless otherwise shown on the Drawings. Side rods of horizontal joint reinforcement shall be lapped at least 6 inches at splices.

D. Joint reinforcement shall be placed in a manner to assure 5/8 inch mortar cover on the exterior face of walls and 1/2 inch mortar cover on interior faces.

E. At intersections bond each course with wire mesh ties or prefabricated joint reinforcement spaced not to exceed 16 inches vertically.

3.2 ANCHORAGE

A. All interior masonry unit partitions that abut exterior walls, when control joints occur at such locations, shall be anchored once every 16 inches vertically with rigid steel anchors. Anchors shall extend at least 4 inches into exterior wall and not less than 18 inches into interior partition.

B. When intersecting walls are carried up separately, the vertical joint shall be regularly toothed or bonded, or the joints provided with rigid steel anchors spaced not more than 16 inches apart vertically.

C. At interior intersecting partitions, the vertical joint shall be tied with wire mesh ties spaced at 16 inches vertically.

3.3 VERTICAL REINFORCEMENT

A. Install vertical reinforcement bars in the hollow cores of masonry units where indicated on the Drawings. Fill all cells containing reinforcement with masonry grout for the full height of the reinforcement.

3.4 MASONRY ANCHORS (TO CONCRETE AND TO STEEL WHERE OCCURS)

A. Provide dovetail anchor slots in concrete for securing masonry facing to concrete walls.

B. Where concrete walls more than l6 inches high are faced with masonry veneer, place anchor slots vertically at 16 inch horizontal centers for the entire height of wall.

C. Fill slots with foam to prevent entrance of cement or grout. Set anchor slots straight at proper locations and securely fasten to forms to prevent displacement while concrete is being poured. In all cases slots shall extend for the full height of the masonry facing.

D. Masonry shall be anchored to concrete or steel columns with dovetail anchors spaced at 16 inch centers vertically along vertical anchor slots.

3.5 RIGID CAVITY INSULATION

A. Install cavity insulation according the manufacturer’s written instructions.

B. Install boards to fit snugly between wall ties.

C. Install boards horizontally on walls.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.6 CONCRETE BLOCK CORE INSULATION

A. Loose fill insulation shall be installed in all ungrouted cores of all exterior hollow masonry walls.

B. The insulation shall be poured directly (or via a hopper) in the top of the wall at any convenient interval (not in excess of 20 ft [6 m]). Wall sections under doors and windows shall be filled before sills are placed.

C. All holes and openings in the wall through which insulation can escape shall be permanently sealed or caulked prior to installation of the insulation. Copper, galvanized steel, or fiber glass screening shall be used in all weep holes.

D. Insulation must remain dry. Cavity caps or other suitable means shall be used as the work progresses to ensure that the insulation is protected from inclement weather.

END OF SECTION

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SECTION 040230 – MASONRY TUCKPOINTING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Furnish all labor, materials, equipment, supervision, and services necessary to tuckpoint the masonry and remove and replace caulk as called out in Section 012300.

1.02 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

1. C67-00……Brick and Structural Clay Tile, Sampling and Testing

2. C216-01…….Facing Brick (Solid Masonry Units Made From Clay or Shale)

C. International Masonry Institute: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Submit grout color sample

C. Submit Face Brick used for replacement

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

B. Contractor: A Company with five documented years of experience in this type of work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 016000.

B. Accept face brick units on site. Inspect for damage.

PART 2 – PRODUCT

2.01 CAULK

A. Polyurethane meeting ASTM C920-98. Tremco Dymonic or equal.

2.02 TUCK POINTING MORTAR

A. Refer to Section 040513, MORTAR for mortar requirements

2.03 REPLACEMENT MASONRY UNITS

A. Face Brick:

1. ASTM C216, Grade SW, Type FBS. Brick shall be classified slightly efflorescent or better when tested in accordance with ASTM C67.

2. Face brick shall match facing brick of the existing building(s) that is being tuck pointed.

B. Other Units to match existing.

PART 3 – EXECUTION

3.01 CUT OUT OF EXISTING MORTAR JOINTS

A. Cut out existing mortar joints (both bed and head joints) and remove by means of a toothing chisel or a special pointer's grinder, to a uniform depth of to 19mm (3/4 inch), or until sound mortar is reached. Take care to not damage edges of existing masonry units to remain.

B. Remove dust and debris from the joints by brushing, blowing with air or rinsing with water. Do not rinse when temperature is below freezing.

3.02 JOB CONDITIONS

A. Protection: Protect newly pointed joints from rain, until pointed joints are sufficiently hard enough to prevent damage.

B. Cold Weather Protection:

1. Tuck pointing may be performed in freezing weather when methods of protection are utilized.
2. Comply with applicable sections of "Recommended Practices for Cold Weather Construction" as published by International Masonry Industry All Weather Council.
3. Existing surfaces at temperatures to prevent mortar from freezing or causing other damage to mortar.

3.03 INSTALLATION OF TUCK POINTING MORTAR

A. Immediately prior to application of mortar, dampen joints to be tuck pointed. Prior to application of pointing mortar, allow masonry units to absorb surface water.

B. Tightly pack mortar into joints in thin layers, approximately 6 mm (1/4 inch) thick maximum.

C. Allow layer to become "thumbprint hard" before applying next layer.

D. Pack final layer flush with surfaces of masonry units. When mortar becomes "thumbprint hard", tool joints.

3.04 TOOLING OF JOINTS

A. Tool joints with a jointing tool to produce a smooth, compacted, concaved joint.

B. Tool joints in patch work with a jointing tool to match the existing surrounding joints.

3.05 REPLACEMENT OF MASONRY UNITS

A. Cut out mortar joints surrounding masonry units that are to be removed, providing surrounding units to remain are not damaged.

1. Units removed may be broken and removed, providing surrounding units to remain are not damaged.
2. Once the units are removed, carefully chisel out the old mortar and remove dust and debris.
3. If units are located in exterior wythe of a cavity or veneer wall, exercise care to prevent debris falling into cavity.

B. Dampen surfaces of the surrounding units before new units are placed.

1. Allow existing masonry to absorb surface moisture prior to starting installation of the new replacement units.
2. Butter contact surfaces of existing masonry and new replacement masonry units with mortar.
3. Center replacement masonry units in opening and press into position.
4. Remove excess mortar with a trowel.

5. Point around replacement masonry units to ensure full head and bed joints.
6. When mortar becomes “thumbprint hard”, tool joints.
7. Assure all weeps are active.

3.06 CLEANING

A. Clean exposed masonry surfaces on completion.

B. Remove mortar droppings and other foreign substances from wall surfaces.

C. First wet surfaces with clean water then wash down with a solution of soapless detergent specially prepared for cleaning brick.

D. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.

E. Free clean surfaces from traces of detergent, foreign streaks or stains. Protect materials during cleaning operations including adjoining construction.

F. Use of muratic acid for cleaning is prohibited.

G. Protect existing landscaping beds & trees. Do not allow tarps, etc., to cover plant life more than 8 hours.

END OF SECTION 040120

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SECTION 04 20 00 – UNIT MASONRY

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Concrete unit masonry exterior walls and interior partitions, complete with reinforcement and anchorages.

B. Installation of anchor sleeves, inserts, and other accessories specified in other sections.

1.02 QUALITY ASSURANCE

A. Qualifications of:

1. Installer: Not less than 3 years documented experience in construction of masonry projects of similar scope and complexity.

B. Regulatory requirements:

1. Perform masonry work in accord with ASCE 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.

1.03 REFERENCES

A. Cited references, or specified portions thereof, current at date of bidding documents unless otherwise specified, govern the work. If conflict between cited standards and project specifications, do not proceed with any work until Architect/Engineer issues written clarification.

B. Standards:

1. ASTM C90 - Specification for Hollow Load Bearing Concrete Masonry Units.
2. ASTM C129 - Specification for Hollow Non-Load-Bearing Concrete Masonry Units.

C. Manufacturers Catalogs: The specified manufacturer's catalogs, current at the date of bidding documents, are incorporated by reference to the same force and effect as if repeated herein at length.

1.04 SUBMITTALS

A. In accordance with Section 01 33 00 submit the following:

1. Product data:
   a. Concrete Block.
   b. Brick.
   c. Admixtures.
   d. Accessories.
   e. Flashings.
   f. Anchors and Ties.
   g. Horizontal Joint Reinforcing.
   h. Fluted Block.
2. Samples for approval of appearance:
   a. Brick for veneer

1.05 DELIVERY, STORAGE & HANDLING

A. Conform to Section 01 60 00, Product Requirements, and this Section.

B. Deliver all materials in sufficient quantity and time to maintain approved construction schedule. Deliver all packaged materials in manufacturer's original containers, with all labels and markings intact and legible. Remove materials and damaged containers immediately from the site.

C. Store all products in a secure, dry location, out of way of construction operations. Store materials on pallets, a minimum of 4 inches off of the ground. Prevent intermixing of granular materials.

D. Handle materials in a manner to prevent damage to the materials, to other stored products, to existing construction and project work. Follow product manufacturer's instructions.

1.06 WARRANTY

A. In accordance with General Conditions:

1. General Contractor's Warranty: One (1) year.

PART 2 – PRODUCTS

2.01 MASONRY

A. Concrete Blocks:

1. Interior non-load-bearing partitions: ASTM C129 Hollow Core Non-Load-Bearing complete with corners, bond beams and lintels to match and compliment block units; lightweight. Nominal face dimensions of 6 in. x 16 in. and thickness as shown on the drawings. Weight of full units shall not exceed 20 pounds per block.

2. Exterior and Below Grade Construction: ASTM C90 Hollow Core Load-Bearing, grade N, complete with corners, bases, bond beams, and lintels to match and compliment block units; normal weight unless otherwise noted on drawings. Nominal face dimensions of 8 in. x 16 in. and thickness as shown on the drawings.

B. Brick Veneer:

1. Brick shall be made from materials, fired, and manufactured in one batch to comply with all applicable requirements of ASTM C216, Grade SW, Type FBS, typically cored; except where superseded by more stringent requirements mentioned herein. ASTM C652 Class H40V brick meeting all other requirements of this specification except for the void area may also be used.

2. Brick shall match type, size, surface texture and color including variations of brick on existing buildings at the site.

2.02 CONCRETE

A. Concrete for bond beams: Provide concrete with 3000 psi compressive strength at 28 days; 3 inch maximum slump; conforming to the following requirements:

1. Cement: ASTM C150, Normal-Type I.

2. Coarse aggregate: Maximum 3/8 in. size; graded in compliance with ASTM C33.

3. Fine Aggregate: Graded in compliance with ASTM C33.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other Sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.04 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

C. Remove excess mortar as Work progresses.

D. Interlock intersections and external corners.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.05 WEEPS

A. Install weep holes in veneer at a maximum of 32 inches on center horizontally above shelf angles. Lay 3/8 inch round, 12 inch long nylon rope in each weep hole and lay horizontally in cavity.

3.06 CAVITY WALL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.

3.07 REINFORCEMENT AND ANCHORAGES

A. Install horizontal joint reinforcement spaced at maximum 16 inches on-center or as shown on the drawings.

B. Place masonry joint reinforcement in first, second, and third horizontal joints above and below openings. Extend minimum 24 inches each side of opening.

C. Place joint reinforcement continuous in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 6 inches each side of openings.

3.08 LINTELS

A. Install lintels where scheduled on drawings.

3.09 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints unless otherwise shown on drawings.

B. Form control joint with a sheet building paper bond breaker, fitted to one side of the hollow contour end of the block unit. Fill the resultant elliptical core with grout fill. Rake joint at exposed

unit faces for placement of backer rod and sealant.

3.10 BUILT-IN WORK

A. As work progresses, build in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items furnished by other Sections.

B. Build in items plumb and level.

C. Bed anchors of metal door frames in adjacent mortar joints.

3.11 TOLERANCES

A. Maximum Variation from Alignment of Columns: Pilasters: 1/4 inch.

B. Maximum Variation from Unit to Adjacent Unit: 1/32 inch.

C. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

D. Maximum Variation From Plumb: 1/4 inch per story noncumulative; 1/2 inch in two stories or more.

E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.12 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit sleeves, grounds.

B. Obtain Architect/Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.13 CLEANING

A. Clean work under provisions of Division 01.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar.

D. Clean soiled surfaces with cleaning solution.

END OF SECTION

SECTION 040513 – MORTAR

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 INDUSTRY STANDARDS

A. Publications of the following institutes, associations, societies, and agencies are referred to in this section.

1. American Society for Testing & Materials, ASTM.

1.03 PRODUCT HANDLING

A. Mortar materials, except sand, shall be delivered in full, unopened bags.

1. Masonry cement shall be stored off the ground and shall be kept covered and protected from weather until used.

1.04 SUBMITTALS

A. Where colored mortar is specified submit samples of colored mortar showing full extent of colors available.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Masonry cement shall comply with the requirements of ASTM C91 and shall be delivered in original bags bearing manufacturer's batch number, date of manufacture and product trade name.

1. Masonry cement shall be non-staining type.

2. Type M masonry cement shall be used on all walls below grade, all foundation walls, and all load bearing walls.

3. Type N masonry cement shall be used on above grade, non-load bearing walls.

B. Aggregates shall be natural sand in accordance with ASTM C144 and graded form No. 4 thru No. 200. Fineness modulus shall not vary more than 0.20.

C. Water shall be clean, fresh, potable, and free of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to mortar or any metal in the wall.

A. within the limits given in Table 2 for masonry cement.

2.02 ADMIXTURES

A. No admixtures of any kind or type shall be used without the written approval of the Architect.

PART 3 – EXECUTION

3.01 MIXING

A. Mortar shall be mixed in compliance with the requirements of ASTM C270 and shall be proportioned

3.02 INSTALLATION

A. All mortar joints in masonry units shall be tooled to concave unless otherwise noted.

B. Mortar shall be installed in conformance with the other applicable sections.

END OF SECTION 040513

SECTION 042113 – VENEER MASONRY SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Concrete masonry, Face brick units.

B. Reinforcement, anchorage, and accessories.

1.02 REFERENCES

A. ACI 530 - Building Code Requirements for Masonry Structures.

B. ACI 530.1 - Specifications for Masonry Structures.

C. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

D. ASTM A123- Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

E. ASTM A167- Stainless and Heat-Resisting Chromium-Nickel Steel Plate.

F. ASTM A525- Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process

G. ASTM A641- Zinc-Coated (Galvanized) Carbon Steel Wire.

H. ASTM B370- Copper Sheet and Strip for Building Construction.

I. ASTM C55- Concrete Building Brick.

J. ASTM C73- Calcium Silicate Face Brick (Sand-Lime Brick).

K. ASTM C90 - Load-Bearing Concrete Masonry Units.

L. ASTM C126- Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.

M. ASTM C216- Facing Brick (Solid Masonry Units Made From Clay or Shale).

N. ASTM C652- Hollow Brick (Hollow Masonry Units Made From Clay or Shale).

O. ASTM C744- Pre-faced Concrete and Calcium Silicate Masonry Units.

P. IMIAC- International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

Q. UL - Fire Resistance Directory.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 – PRODUCTS

2.01 BRICK UNITS

A. Face Brick: To match existing building brick. Submit sample to be approved by Architect.

B. Size and Shape: To match existing building brick. Submit sample to be approved by Architect.

2.02 CUT STONE VENEER AND TRIM

A. Cut Indiana Oolitic Limestone.

B. Grade: Select

C. Color: Buff

D. Surface Texture: Smooth

E. Accessories:

1. Anchors, dowels, ties: Galvanized steel, 1.25 oz./sq. ft. of sizes and configurations required for support of stone and superimposed loads.

2. Setting Shims: Plastic type.

2.03 REINFORCEMENT ANCHORAGE

A. Wall Ties: Formed steel wire, adjustable, hot dip galvanized to ASTM A123.

2.04 FLASHINGS

A. Plastic Flashings: Sheet polyvinyl chloride; 10 mil.

B. Lap Sealant: Butyl

2.05 ACCESSORIES

A. Building Paper: No. 15 asphalt saturated felt.

B. Weeps: Preformed plastic tubes.

C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other sections of work are properly sized and located.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:

1. Bond: Running

2. Coursing: Three units and three mortar joints to equal 8 inches.

3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry walls from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 WEEPS

A. Install weeps in veneer at 24 inches on center horizontally above shelf angles and lintels and at bottom of walls.

3.06 CAVITY BEHIND VENEER

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.

B. Provide cavity drainage material at minimum 1-inch thick by 10-inch high with dovetail profile to collect mortar drippings.

3.07 REINFORCEMENT AND ANCHORAGE

A. Secure wall ties to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place at maximum 3 inches on center each way around perimeter of openings, within 12 inches of openings.

3.08 MASONRY FLASHINGS

A. Extend flashings horizontally at foundation walls and above ledge or shelf angles and lintels.

B. Turn flashing up minimum 8 inches and bed into mortar joint or masonry seal to sheathing over steel stud back-up.

C. Lap end joints minimum 6 inches and seal watertight.

D. Turn flashing, fold, and seal at corners, bends, and interruptions.

3.09 LINTELS

A. Install loose steel lintels over openings.

B. Maintain minimum 4 inch bearing on each side of opening.

3.10 CONTROL JOINTS

A. Do not continue horizontal joint reinforcement through control joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.11 CLEANING

A. Remove excess mortar and mortar smears.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.12 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION 042113

SECTION 05 05 33 – ANCHOR SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:
   1. Contractor shall provide all professional services, labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install anchor systems.
   2. This Section includes all anchor systems required for the Work, but not specified under other Sections.

B. Coordination:
   1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before anchor systems Work.

1.02 REFERENCES

A. Standards referenced in this Section are:
   1. ACI 318, Building Code Requirements for Structural Concrete.
   2. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.
   3. ACI 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
   4. ANSI B212.15, Cutting Tools - Carbide-tipped Masonry Drills And Blanks For Carbide-tipped Masonry Drills.
   5. ANSI/MSS SP-58, Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.
   6. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
   7. ASTM A276, Specification for Stainless Steel Bars and Shapes.
   8. ASTM A493, Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.
   9. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
   10. ASTM A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
   11. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
   12. ASTM C307, Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.
   13. ASTM C881/C881M, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
   14. ASTM D695, Test Method for Compressive Properties of Rigid Plastics.
   15. ASTM D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
   16. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
   17. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.
   18. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   19. ASTM F594, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   20. ASTM F1554, Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.
   21. FS A-A-1922A, Shield, Expansion (Caulking Anchors, Single Lead).
   22. FS A-A-1923A, Concrete Expansion Anchors.
   23. FS A-A-1925A, Shield, Expansion (Nail Anchors).
   24. FS A-A-55614, Shield, Expansion (non-drilling expansion anchors).
   25. ICC-ES AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.

26. ICC-ES AC58, Acceptance Criteria for Adhesive Anchors in Masonry Elements.
27. ICC-ES AC60, Acceptance Criteria for Anchors in Unreinforced Masonry Elements.
28. ICC-ES AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
29. ICC-ES AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
30. ISO 3506-1, Mechanical Properties of Corrosion-Resistant Stainless Steel Fasteners -- Part 1: Bolts, Screws and Studs.
31. NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.03 QUALITY ASSURANCE

A. Qualifications:
   1. Testing Laboratory: Shall comply with ASTM E329 and shall be experienced in tension testing of post-installed anchoring systems.
   2. Post-installed Anchor Installer:
      a. Mechanical Anchors: Installer shall be experienced and trained by post-installed anchor system manufacturer in proper installation of manufacturer's products. Product installation training by distributors or manufacturer's representatives is unacceptable unless the person furnishing the training is qualified as a trainer by the anchor manufacturer.
      b. Adhesive Anchors: Installation shall be performed by personnel certified under an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchors Installer Certification Program, or equivalent. Description of equivalent programs shall be submitted for ENGINEER's approval and acceptance by the building official having jurisdiction.

1.04 SUBMITTALS

A. Shop drawings, product data, samples and certifications for all materials herein shall be submitted in accordance with Section 01 33 00 Submittal Procedures.
B. Submittals: Submit the following:
   1. Shop Drawings:
      a. Listing of all anchor systems products intended for use in the Work including product type, intended location in the Project, and embedded lengths.
   2. Product Data:
      a. Manufacturer's specifications, load tables, dimension diagrams, acceptable base material conditions, acceptable drilling methods, and acceptable bored hole conditions.
      b. When required by Engineer, copies of valid ICC ES reports that presents load-carrying capacities and installation requirements for anchor systems.
   3. Certificates:
      a. For each type of anchor bolt or threaded rod, submit copies of laboratory test reports and other data required to demonstrate compliance with the Contract Documents.
      b. Post-installed anchor system manufacturer's certification that installer received training in the proper installation of manufacturer's products required for the Work.
   4. Manufacturer's Instructions:
      a. Installation instructions for each anchor system product proposed for use, including bore hole cleaning procedures and adhesive injection, cure and gel time tables, and temperature ranges (storage, installation and in-service).

1.05 DELIVERY, STORAGE AND HANDLING

A. Conform to Section 01 60 00, Product Requirements, and this Section.
B. Storage and Protection:
   1. Keep materials dry during delivery and storage.
   2. Store adhesive materials within manufacturer's recommended storage temperature range.
   3. Protect anchor systems from damage at the Site. Protect products from corrosion and deterioration.

PART 2 – PRODUCTS

2.01 SYSTEM PERFORMANCE

A. General:

1. At locations where conditions dictate that Work specified in other Sections is to be of corrosion resistant materials, provide associated anchor systems of stainless steel materials, unless other corrosion-resistant anchor system material is specified. Provide anchor systems of stainless steel materials where stainless steel materials are required in the Contract Documents.
2. Stainless Steel Nuts:
   a. For anchor bolts and adhesive anchors, provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts for stainless steel anchors used for anchoring equipment, gates, and weirs, and other locations, if any, where the attachment will require future removal for operation or maintenance. Provide lock washer or double nuts on each anchorage device provided for equipment, as required by equipment manufacturer.
   b. For other locations, provide for each anchorage device a nut as specified or as required by anchor manufacturer. When ASTM A194/A194M, Grade 8S (Nitronic 60) nuts are not required for anchor bolts and adhesive anchors as specified in this Section, provide anti- seizing compound where stainless steel rods are used with stainless steel nuts of the same type.
3. Materials that can contact potable water or water that will be treated to become potable shall be listed in NSF/ANSI 61.

B. Design Criteria

1. Size, Length, and Load-carrying Capacity: Comply with the Contract Documents. When size, length or load-carrying capacity of anchor system is not otherwise shown or indicated, provide the following:
   a. Anchor Bolts: Provide size, length, and capacity required to carry design load based on values and requirements of Paragraph 3.2.A of this Section. For conditions outside limits of critical edge distance and spacing in Paragraph 3.2.A of this Section, minimum anchor bolt embedment as shown or indicated in Paragraph 3.2.A of this Section apply and capacity shall be based on requirements of Laws and Regulations, including applicable building codes.
   b. Adhesive Anchors, Expansion Anchors, or Concrete Inserts: Provide size, length, type, and capacity required to carry design load. Anchor capacity shall be based on the procedures required by the building code in effect at the Site. Where Evaluation Service Reports issued by the ICC Evaluation Service are required in this Section, anchor capacities shall be based on design procedure required in the applicable ICC Evaluation Service Report.
      1) General: Determine capacity considering reductions due to installation and inspection procedures, embedment length, strength of base fastening materials, spacing, and edge distance, as indicated in the manufacturer's design guidelines. For capacity determination, concrete shall be assumed to be in the cracked condition, unless calculations demonstrate that the anchor system will be installed in an area that is not expected to crack under any and all conditions of design loading.
      2) Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum embedment depth of the greater of the following: required to develop tensile strength of anchor, or a minimum embedment of 10 anchor diameters; and minimum anchor spacing and edge distance of 12 anchor diameters.
      3) Masonry Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
      4) Concrete Expansion Anchors: Unless otherwise shown or indicated in the

Contract Documents or approved by Engineer, provide minimum embedment depth of six anchor diameters, and minimum anchor spacing and edge distance of seven anchor diameters.

5) Masonry Expansion Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
6) Concrete Undercut Anchors: Unless otherwise shown or indicated in the Contract Documents, or approved by Engineer, provide minimum anchor spacing and edge distance as tabulated in anchor manufacturer's instructions.

2. Design Loads. Comply with the Contract Documents. When design load of supported material, equipment, or system is not otherwise shown or indicated, provide the following:
   a. Equipment Anchors: Use design load recommended by equipment manufacturer. When equipment can be filled with fluid, use loads that incorporate equipment load and load imposed by fluid.
   b. Pipe Hangers and Supports: Use full weight of pipe, and fluid contained in pipe that are tributary to the support plus the full weight of valves and accessories located between the hanger or support being anchored and the next hanger or support.
   c. Hangers and Supports for Electrical Systems, and HVAC, Plumbing, and Fire Suppression Systems and Piping: Use the full weight of supported system that is tributary to the support plus the full weight of accessories located between the hanger or support being anchored and the next hanger or support. When piping or equipment is to be filled with fluid, anchor systems shall be sized to support such loads in addition to the weight of the equipment, piping, or system, as applicable.
   d. Delegated Design: When anchor systems are used for supporting materials, equipment, or systems delegated to a design professional retained by Contractor, Subcontractor, or Supplier, provide anchor system suitable for loads indicated in delegated design documents and consistent with the design intent expressed in the Contract Documents.

C. Application:
1. Anchor Bolts:
   a. Where anchor bolt is shown or indicated, use cast-in-place anchor bolt unless another anchor type is approved by Engineer.
   b. Provide anchor bolts as shown or indicated, or as required to secure structural element to appropriate anchor surface.
2. Concrete Adhesive Anchors:
   a. Use where adhesive anchors are shown or indicated for installation in concrete.
   b. Suitable for use where subject to vibration.
   c. Suitable for use in exterior locations or locations subject to freezing.
   d. Suitable for use in submerged, intermittently submerged, or buried locations.
   e. Do not use in overhead applications, unless otherwise shown or approved by Engineer.
   f. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.
3. Concrete Masonry Adhesive Anchors:
   a. Use where adhesive anchors are shown or indicated for installation in grout-filled or hollow masonry units.
   b. Suitable for use where subject to vibration.
   c. Suitable for use in exterior locations or locations subject to freezing.
   d. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.
4. Concrete Wedge Expansion Anchors:
   a. Use where expansion anchors are shown or indicated for installation in concrete.
   b. Do not use where subject to vibration.
   c. Do not use in exterior locations or locations subject to freezing.
   d. Do not use in submerged, intermittently submerged, or buried locations.
   e. Suitable for use in overhead applications.

5. Grout-filled Concrete Masonry Wedge Expansion Anchors:
   a. Use where expansion anchors are shown or indicated for installation on the interior face of grout-filled unit masonry.
   b. Do not use where subject to vibration.
   c. Do not use in exterior locations or locations subject to freezing.
6. Hollow Concrete Masonry Sleeve Expansion Anchors:
   a. Use where expansion anchors are shown or indicated for installation in hollow concrete unit masonry or solid brick.
   b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
   c. Do not use where subject to vibration.
   d. Do not use in exterior locations or locations subject to freezing.
7. Drop-in Expansion Anchors:
   a. Use drop-in expansion anchors installed in concrete where light-duty anchors are required to support piping or conduit two-inch diameter or smaller.
   b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
   c. Do not use where subject to vibration.
   d. Do not use at submerged, intermittently submerged, or buried locations.
   e. Do not use in exterior locations or locations subject to freezing.
   f. Suitable for use in overhead applications.
8. Concrete Undercut Anchors:
   a. Use where undercut anchors are shown or indicated for installation in concrete.
   b. Suitable for use where subject to vibration.
   c. Do not use in submerged, intermittently submerged, or buried locations.
   d. Do not use in exterior locations or locations subject to freezing.
   e. Suitable for use in overhead applications.
9. Concrete Inserts:
   a. Use only where shown or indicated in the Contract Documents.
   b. Allowed for use to support pipe hangers and pipe supports for pipe size and loading recommended by the concrete insert manufacturer.
10. Drive-In Expansion Anchors:
    a. Use drive-in expansion anchors installed in concrete, precast concrete, grouted masonry units, or brick, where light-duty anchors are required to support piping or conduit one-inch diameter and smaller.
    b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
    c. Do not use in overhead applications.
11. For Use in Precast Concrete Planks:
    a. To support piping or conduit two-inch diameter and smaller, use low-profile drop-in anchors, hollow concrete masonry adhesive anchors, or through-bolts.
    b. For piping greater than two-inch diameter, or to support safety-related systems, use through-bolts. Each through-bolt shall consist of threaded rod, nuts, washers, and bearing plate.

2.02 MATERIALS

A. Anchor Bolts:
   1. Provide stainless steel straight threaded rods complying with ASTM F593, AISI Type 316, Condition A, with ASTM F594, AISI Type 316, stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required. Other AISI types may be used when approved by Engineer. Hooked bolts are unacceptable.
      a. Equipment: Provide anchor bolts complying with material requirements of this Section and equipment manufacturer's requirements relative to size, embedment length, and anchor bolt projection. Anchor bolts shall be straight threaded rods with washers and nuts as specified in this Section. Hooked bolts are unacceptable.

2. Anchoring of Structural Elements: Provide anchor bolts of size, material, and strength shown or indicated in the Contract Documents.

B. Concrete Adhesive Anchors:

1. General:
   a. Adhesive anchors shall consist of threaded rods anchored into hardened concrete using an adhesive system.
2. Products and Manufacturers: Provide one of the following:
   a. HIT-RE 500-V3 Injection Epoxy Adhesive Anchoring System, by Hilti Fastening Systems, Inc.
   b. HIT-HY 200-A and HIT-HY 200-R Adhesive Anchoring System, by Hilti Fastening Systems, Inc
   c. SET-XP Adhesive anchoring system, by Simpson Strong-Tie Company, Inc.
   d. Or equal.
3. Adhesive:
   a. Adhesive system shall use two-component adhesive mix.
   b. Adhesives shall have a current evaluation report by ICC Evaluation Service for use in both cracked and uncracked concrete with seismic recognition for SDC A through F as tested and assessed in accordance with ICC-ES AC308, which incorporates the requirements of ACI 355.4-11
   c. Adhesives shall have minimum bond strength and minimum design bond strength in accordance with Table 05 05 33-A:

TABLE 05 05 33-A
ADHESIVE BOND STRENGTH [1,2]

Bond Strength (psi)					
Rod Diameter	**Uncracked**	**Cracked**	**Dowel Size**	**Uncracked**	**Cracked**
1/2-inch	1670	880	#4	1500	1080
5/8-inch	1670	750	#5	1460	1090
3/4-inch	1670	665	#6	1415	1015
7/8inch	1525	610	#7	1370	835
1-inch	1360	595	#8	1330	760
-	-	-	#9	1560	850
1.25-inch	1070	595	#10	1240	475

Table Notes:
1. Bond strengths listed for hammer-drilled, dry hole.
2. Bond strengths listed for maximum short term concrete temperature of 130°F and maximum long term concrete temperature of 110°F.

4. Anchor:
   a. Provide continuously-threaded, AISI Type 316 stainless steel adhesive anchor rod. Threaded rods shall comply with the concrete adhesive anchor manufacturer's specifications as included in the ICC Service Evaluation Report for the anchor submitted. Nuts shall have specified proof load stresses equal to or greater than the minimum tensile strength of the stainless steel threaded rod used. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required.

C. Concrete Masonry Adhesive Anchors:

1. General:
   a. Grout-filled concrete masonry adhesive anchors shall consist of threaded rods anchored into grout-filled concrete block masonry using an adhesive system.
   b. Hollow concrete masonry adhesive anchors shall consist of threaded rods with a cylindrical mesh steel or plastic screen tube anchored into hollow concrete block

masonry using an adhesive system.
2. Products and Manufacturers: Provide one of the following:
   a. HIT-HY 270 Hybrid Adhesive Anchor System, by Hilti Fastening Systems, Inc.
   b. Acrylic-Tie Adhesive, by Simpson Strong-Tie Company, Inc.
   c. Or equal.
3. Adhesive:
   a. Adhesive system shall use two-component adhesive mix.
   b. Adhesives shall have current ICC Evaluation Service Report for use in grout-filled concrete masonry, tested and assessed in accordance with ICC-ES AC 58 and ICC-ES AC 60.
4. Anchor:
   a. Provide stainless steel adhesive anchor rod complying with ASTM F593, AISI Type 316, Condition CW, with ASTM F594, AISI Type 316 stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required.
5. Mesh Screen Tube (for hollow masonry applications):
   a. Provide with mesh size, length, and diameter as specified by adhesive anchor manufacturer.

D. Concrete Wedge Expansion Anchors:
1. General:
   a. Concrete wedge expansion anchors shall consist of stud, wedge, nut, and washer.
2. Products and Manufacturers: Provide one of the following:
   a. Kwik Bolt TZ Wedge Anchor, by Hilti Fastening Systems, Inc.
   b. Strong Bolt 2 Wedge Anchor, by Simpson Strong-Tie Company, Inc.
   c. Or equal.
3. Anchors shall comply with physical requirements of FS A-A-1923A, Type 4. Provide concrete wedge expansion anchors suitable for use in cracked and uncracked concrete in accordance with ACI 318 Chapter 17 and ACI 350, Appendix D. Demonstrate suitability of cracked concrete wedge anchors in accordance with ACI 355.2 prequalification tests.
4. Provide expansion anchors complete with nuts and washers, AISI Type 316 stainless steel, in accordance with ASTM A276 or ASTM A493.
5. Concrete wedge expansion anchors shall have a current ICC Evaluation Service Report for use in both cracked and uncracked concrete with seismic recognition in seismic design Categories A through F when tested and assessed in accordance with ICC-ES AC193.

E. Grout-filled Masonry Wedge Expansion Anchors:
1. General:
   a. Grout-filled masonry wedge expansion anchors shall each consist of stud, wedge, nut, and washer.
2. Product and Manufacturers: Provide one of the following:
   a. Kwik-Bolt 3 Expansion Anchors, by Hilti Fastening Systems, Inc.
   b. Wedge-All Wedge Anchors, by Simpson Strong-Tie Company, Inc.
   c. Or equal.
3. Interior Dry Non-corrosive Locations: Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633. Use in other locations is not allowed.
4. Anchors shall comply with physical requirements of FS A-A-1923A, Type 4. Anchors shall be non-bottom bearing type with single-piece steel expansion clip providing 360-degree contact with base material and shall not require oversized holes for installation.
5. Grout-filled masonry wedge expansion anchors shall have a current ICC Evaluation Service report for use in fully-grouted concrete masonry construction when tested and assessed in accordance with ICC-ES AC01.

F. Hollow Concrete Masonry Sleeve Expansion Anchors:
1. General:
   a. Sleeve expansion anchors shall each consist of an externally threaded stud with full length expanding sleeve.

2. Products and Manufacturers: Provide one of the following:
   a. HLC Sleeve Anchors, by Hilti Fastening Systems, Inc.
   b. Dynabolt Sleeve Anchors, by ITW Red Head.
   c. Or equal.
3. Anchors shall comply with physical requirements of FS A-A-1922A. Anchors shall be non-bottom bearing type with single-piece steel expansion sleeve providing 360-degree contact with base material, and shall not require oversized holes for installation.
4. Provide expansion anchors complete with nuts and washers, Type 304 stainless steel, in accordance with ASTM A276 or ASTM A493.

G. Drop-in Expansion Anchors:
1. General:
   a. Drop-in expansion anchors shall each consist of an internally threaded, deformation- controlled expansion anchor with pre-assembled expander plug.
2. Products and Manufacturers: Provide one of the following:
   a. HDI Drop-In Anchors, by Hilti Fastening Systems, Inc.
   b. Drop-In Anchor, by Simpson Strong-Tie Company, Inc.
   c. Or equal.
3. Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633, complying with physical requirements of FS A-A-55614, Type I. Anchors shall be flush or shell type. Provide low-profile anchors for use in precast concrete planks.

H. Concrete Undercut Anchors:
1. General:
   a. Each concrete undercut anchor shall consist of threaded stud, thick-walled expansion sleeve, expander coupler, and nut and washer. Anchors shall be pre-set type or through-set type, as shown on the Drawings.
2. Products and Manufacturers: Provide one of the following:
   a. HDA Undercut Anchor, by Hilti Fastening Systems, Inc.
   b. DUC Ductile Undercut Anchor, by USP Structural Connectors.
   c. Or equal
3. Provide concrete undercut expansion anchors in accordance with ACI 318 Chapter 17 and ACI 350, Appendix D. Demonstrate suitability of cracked concrete undercut anchors in accordance with ACI 355.2 prequalification tests.
   a. Installed anchor shall exhibit form fit between bearing elements and the undercut in the concrete.
4. Interior Dry Non-Corrosive Locations: Provide carbon steel anchors, complete with nuts and washers, zinc plated, in accordance with ASTM B633.
5. Other Locations: Provide stainless steel anchors, complete with nuts and washers, manufactured of AISI Type 316 stainless steel or materials complying with ISO 3506-1 and having corrosion resistance equivalent to AISI Type 316 stainless steel.
6. Concrete undercut anchors shall have a current ICC Evaluation Service Report for use in both cracked and uncracked concrete for seismic recognition for seismic design Categories A through F when tested and assessed in accordance with ICC-ES AC193.

I. Concrete Inserts:
1. Manufacturers: Provide products of one of the following:
   a. Unistrut Corporation.
   b. Cooper B-Line, Inc.
   c. Anvil International, Inc.
2. Spot Concrete Inserts:
   a. Provide inserts recommended by insert manufacturer for required loading. Inserts shall comply with ANSI/MSS SP-58, malleable iron, Type 18. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Provide nuts compatible with insert and to suit threaded hanger rod sizes.
3. Continuous Concrete Inserts:

a. Provide inserts recommended by insert manufacturer for required loading. Inserts shall be continuous type and shall be manufactured from minimum 12-gage cold-formed channel sections, complying with ASTM A1011/A1011M, stainless steel, Grade 33, complete with styrofoam inserts, end caps, and means for attaching to forms. Provide channel nuts compatible with insert suitable for threaded hanger rod sizes.

4. Provide inserts with plain finish.

J. Drive-In Expansion Anchors:
1. General:
a. Drive-In expansion anchors shall each consist of stainless steel drive pin and expanding alloy body.
2. Products and Manufacturers: Provide one of the following:
a. Metal HIT Anchor, by Hilti Fastening Systems, Inc.
b. Zinc Nailon Anchor, by Simpson Strong-Tie Company, Inc.
c. Or equal.
3. Provide Type 304 stainless steel drive pin with zinc alloy body. Anchor shall comply with physical requirements of FS A-A-1925A, Type 1.

K. Unless approved by Engineer, do not use power-actuated fasteners or other types of bolts and fasteners not specified in this Section.

L. Anti-Seizing Compound:
1. Products and Manufacturers: Provide one of the following:
a. Pure Nickel Never-Seez, by Bostik.
b. Nickel-Graf, by Anti-Seize Technology.
c. Or equal.
2. Provide pure nickel anti-seizing compound.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine conditions under which materials will be installed and advise Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Anchor Bolts:
1. Provide anchor bolts as shown or indicated in the Contract Documents, or as required to secure structural element to the appropriate anchor surface.
2. Locate and accurately set anchor bolts using templates or other devices as required, prior to placing concrete. Wet setting of anchor bolts is unacceptable.
3. Protect threads and shank from damage during installation and subsequent construction operations.

4. Unless otherwise shown or approved by Engineer anchor bolts shall comply with Table 05 05 33-B:

TABLE 05 05 33-B:
SINGLE ANCHOR ALLOWABLE LOADS ON ANCHOR BOLTS[1]

Bolt Diameter (inch)	F1554 Grade 36 F593 Type 316, Condition A				F1554 Grade 55			
	Minimum Embedment (inch)	Minimum Edge Distance and Spacing[2]	Shear[3,4] (lb)	Tension[3] (lb)	Minimum Embedment (inch)	Minimum Edge Distance and Spacing[2]	Shear[3] (lb)	Tension[3] (lb)
1/2	6	9	1,262	2,420	8.5	12.75	1,660	3,190

5/8	7.5	11.25	2,010	3,860	10.5	15.75	2,640	5,080
3/4	9	13.5	2,974	5,720	13	19.5	3,910	7,520
7/8	10.5	15.75	4,106	7,890	15	22.5	5,400	10,390
1	12	18	5,386	10,360	17	25.5	7,090	13,450
1 1/8	13.5	20.25	6,787	13,052	19	28.5	8,930	16,580
1 1/4	15	22.5	8,617	16,572	21	31.5	11,340	20,040

Table Notes:

1. Table is based on ACI 318 Chapter 17 and ACI 350, Appendix D, f'c = 4000 psi. Table 05 05 33-B is not applicable to anchor bolts embedded in grouted masonry.
2. Critical edge distance and spacing are indicated in the table. Capacity of anchor bolts for other combination of edge distances and spacing shall be evaluated in accordance with ACI 318 Chapter and ACI 350, Appendix D.
3. Values for shear and tension listed are not considered to act concurrently. Interaction of tension and shear will be evaluated by Engineer in accordance with ACI 318 Chapter 17 and ACI 350, Appendix D.

B. Adhesive Anchors, Undercut Anchors, and Expansion Anchors – General:
   1. Prior to drilling, locate existing reinforcing steel in vicinity of proposed holes. If reinforcing conflicts with proposed hole location, obtain Engineer's approval of alternate hole locations to avoid drilling through or damaging existing reinforcing bars.

C. Adhesive Anchors:
   1. Installation conditions shall comply with all requirements of the approved product Evaluation Service Report (ESR), including "Conditions of Use." Comply with manufacturer's written installation instructions and the following.
   2. Drill holes to adhesive system manufacturer's recommended drill bit diameter to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits that comply with the tolerances of ANSI B212.15. Core-drilled holes are unacceptable.
   3. Before setting adhesive anchor, hole shall be made free of dust and debris by method recommended by adhesive anchor system manufacturer. Hole shall be brushed with adhesive system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.
   4. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.
   5. Prior to injecting adhesive into the drilled hole, dispense, to a location appropriate for such waste, an initial amount of adhesive from the mixing nozzle, until adhesive is uniform color.
   6. Inject adhesive into hole through injection system-mixing nozzle and necessary extension tubes, placed to bottom of hole. Discharge end shall be withdrawn as adhesive is placed but kept immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during anchor placement.
   7. Twist anchors during insertion into partially-filled hole to guarantee full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.
   8. Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining Work that could place load on installed adhesive anchors. Do not begin adjoining Work until adhesive anchors are successfully tested or when allowed by Engineer.
   9. Limitations:
      a. At time of anchor installation, concrete shall have compressive strength (f'c) of not less than 2,500 psi.
      b. At time of anchor installation, concrete shall have age of not less than 21 days.
      c. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such

as heated enclosures, necessary to ensure that base material temperature complies with anchor systems manufacturer's requirements during installation and curing of adhesive anchor system.

d. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by anchor system manufacturer. Cost of corrective measures, including but not limited to redesign of anchors due to decreased anchor capacities, shall be paid by Contractor.

e. Embedment depths shall be based on installation in normal-weight concrete with compressive strength of 2,500 psi when embedded in existing concrete, and 4,000 psi when embedded in new concrete.

D. Expansion Anchors:

1. Comply with expansion anchor manufacturer's written installation instructions and the following:
2. Drill holes using anchor system manufacturer's recommended drill bit diameter and to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances of ANSI B212.15. Core drilled holes are unacceptable.
3. Before installing anchor, hole shall be made free of dust and debris by method recommended by anchor system manufacturer. Hole shall be brushed with anchor system manufacturer- approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.
4. Before installing anchor, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.
5. Protect threads from damage during anchor installation. Drive anchors not less than four threads below surface of the attachment. Set anchors to anchor manufacturer's recommended torque using a torque wrench.
6. Limitations:
   a. At time of anchor installation, concrete shall have age of not less than 7 days.
   b. At time of anchor loading, concrete shall have attained full specified compressive strength (f'c).

E. Concrete Undercut Anchors:

1. Comply with undercut anchor manufacturer's written installation instructions and the following.
2. Protect threads from damage during anchor installation.
3. Drill hole to anchor manufacturer's specified depth and diameter using a drill bit matched to the specific anchor.
4. Before setting the undercut anchor, hole shall be free of dust and debris using method recommended by undercut anchor system manufacturer. Hole shall be blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.
5. Insert the anchor by hand until anchor reaches bottom of hole.
6. Set anchor in accordance with manufacturer's instructions using anchor manufacturer's specified setting tool.
7. Verify that the setting mark is visible on the threaded rod above the sleeve.
8. Anchor shall be set to manufacturer's recommended torque, using a torque wrench.

F. Concrete Inserts:

1. Comply with concrete insert manufacturer's installation instructions.
2. Inserts shall be flush with slab bottom surface.
3. Protect embedded items from damage during concrete placing. Ensure that embedded items are securely fastened to prevent movement during concrete placing and ensure that embedded items do fill with concrete during concrete placing.
4. Inserts intended for piping greater than four-inch diameter shall be provided with hooked rods attached to concrete reinforcing.

G. Anti-Seizing Compound:

1. Provide anti-seizing compound in accordance with anti-seizing compound

manufacturer's installation instructions, at locations indicated in Paragraph 2.1.B of this Section.

2. Do not use anti-seizing compound at locations where anchor bolt or adhesive anchor will contact potable water or water that will be treated to become potable.

3.03 CLEANING

A. After embedding concrete is placed, remove protection and clean bolts and inserts.

3.04 FIELD QUALITY CONTROL

A. Site Tests:
   1. Owner Will employ testing agency to perform field quality tensile testing of production adhesive anchors at the Site, unless otherwise specified.
      a. Testing shall comply with ASTM E488.
      b. Test at least ten percent of all types of adhesive anchors. If one or more adhesive anchors fail the test, Contractor shall pay cost of testing, or at Engineer's option Contractor may arrange for testing paid by Contractor, for all adhesive anchors of same diameter and type installed on the same day as the failed anchor. If anchors installed on the same day as the failed anchor also fail the test, Engineer may require retesting of all anchors of the same diameter and type installed in the Work. Contractor shall be responsible for retesting costs.
      c. Engineer will direct which adhesive anchors are to be tested and indicate test load to be used
      d. Apply test loads with hydraulic ram.
      e. Displacement of post-installed anchors shall not exceed D/10, where D is nominal diameter of anchor being tested.
   2. Correct defective Work by removing and replacing or correcting, as directed by Engineer.
   3. Contractor shall pay for all corrections and subsequent testing required to confirm competence in the installation of post-installed mechanical anchors.
   4. Testing agency shall submit test results to Contractor and Engineer within 24 hours of completion of test.

B. Manufacturer's Services:
   1. Provide at the Site services of qualified adhesive manufacturer's representative during initial installation of adhesive anchor systems to train Contractor's personnel in proper installation procedures. Manufacturer's representative shall observe to confirm that installer demonstrates proper installation procedures for adhesive anchors and adhesive material.

END OF SECTION

SECTION 05 12 00 – STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all professional services, labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install structural steel framing, including surface preparation and shop priming.
2. Structural steel framing is the Work defined in AISC 303, Section 2, and as shown or indicated in the Contract Documents. The Work also includes:
    a. Providing openings in and attachments to structural steel framing to accommodate the Work under this and other Sections and providing for structural steel framing items such as anchorage devices, studs, and all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before structural steel framing Work.

C. Related Sections:

1. Section 03 60 00, Grouting.
2. Section 05 05 33, Anchor Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AISC 303, Code of Standard Practice for Steel Buildings and Bridges.
2. AISC 325, Steel Construction Manual.
3. AISC 360, Specification for Structural Steel Buildings.
4. ASME B46.1, Surface Texture (Surface Roughness, Waviness and Lay).
5. ASTM A6/A6M, Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
6. ASTM A36/A36M, Specification for Carbon Structural Steel.
7. ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
8. ASTM A108, Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
9. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
10. ASTM A325, Specification for Structural Bolts, Steel, Heat-Treated, 120/105 ksi Minimum Tensile Strength.
11. ASTM A490, Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
12. ASTM A500/A500M, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

13. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
14. ASTM A572/A572M, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
15. ASTM A992/A992M, Specification for Structural Steel Shapes.
16. ASTM A1085/1085M, Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
17. ASTM E329, for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
18. ASTM F436, Specification for Hardened Steel Washers.
19. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
20. ATM F959, Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
21. ASTM F1852, Specification for "Twist off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
22. AWS D1.1/D1.1M, Structural Welding Code-Steel.
23. CMAA 74, Specifications for Top Running & Under Running Single Girder Electric Traveling Cranes Utilizing Under Running Trolley Hoist.
24. ISO 2859-1, Sampling Procedures for Inspection by Attributes -- Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection.
25. ISO 4017, Hexagon Head Screws -- Product Grades A and B.
26. RCSC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Steel Fabricator:

   a. Structural steel fabricating plant shall possess current certificate from AISC stating that the fabrication facility complies with requirements for "Certified Building Fabricator" (BU) of AISC's quality certification program. Fabricating plant shall maintain this certification throughout time of fabrication for this Project.

2. Welders and Welding Processes:

   a. Qualify welding processes and welding operators in accordance with AWS D1.1/D1.1M, Section 5, Qualification.

   b. Each welder employed on or to be employed for the Work shall possess current AWS certification in the welding process with which welder will be working. Certifications shall be current and valid throughout the Work.

3. Surveyor:

   a. Engage a registered professional land surveyor legally qualified to practice in the same jurisdiction as the Site, and experienced in providing surveying services of the kind indicated.

   b. Responsibilities include but are not necessarily limited to:

      1) Performing or supervising performance of field survey work to check lines and

elevations of concrete and masonry bearing surfaces, and locations of anchorage devices and similar devices, before steel erection proceeds.

2) Notifying Contractor and Engineer in writing when surveyed Work does not comply with the Contract Documents.

3) Submit to Contractor field survey reports.

4. Professional Engineer:

a. Contractor or structural steel framing manufacturer shall retain a registered professional engineer legally qualified to practice in the same state as the Site to design steel framing connections as indicated in the Contract Documents.

b. Responsibilities include:

1) Reviewing steel framing connections performance and design criteria stated in the Contract Documents.

2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to Engineer by Contractor.

3) Preparing or supervising preparation of design calculations and related Shop Drawings.

4) Signing and sealing all design calculations.

5) Certifying that:

a) Design of metal building systems has been performed in accordance with performance and design criteria stated in the Contract Documents, and

b) Design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Complete details and schedules for fabrication and shop assembly of members and details, schedules, procedures, and diagrams showing proposed sequence of erection. Shop Drawings shall not be reproductions of Contract Drawings.

b. Include complete information for fabrication of the structure's components, including but not limited to location, type, and size of bolts, details of blocks, copes and cuts, connections, camber, holes, member sizes and lengths, and other pertinent data. Clearly indicate welds using standard AWS notations and symbols, and clearly show or indicate size, length, and type of each weld.

c. Setting drawings, templates, and directions for installing anchorage devices.

2. Product Data:

a. Manufacturer's specifications and installation instructions for products listed below.

1) High-strength bolts of each type, including nuts and washers.

2) Welding electrodes and rods.

3) Load indicator bolts and washers.

B. Delegated Design Submittals:

1. Design Data: Submit the following:

a. Design Calculations:

1) Complete calculations required for the design of the delegated steel framing connections as one package with the Shop Drawings. Structural calculations shall include all specified performance criteria and design loads used in the design. All calculations and assumptions shall be presented so that Engineer can easily follow the progress and logic of Contractor's professional engineer. The design analysis shall include the name and office phone number of the designer to answer questions during the shop drawing review.

b. Design calculations shall be signed, sealed, and dated by Contractor's professional engineer. State of professional engineer's registration, registration number, and name on seal shall be clearly legible.

C. Informational Submittals: Submit the following:

1. Certificates.

a. Fabricator's AISC quality certification.

b. Welders' certifications.

c. Certified reports of laboratory tests on previously-manufactured, identical materials, and other data as necessary, to demonstrate compliance with the Contract Documents for the materials listed below:

1) Structural steel of each type, including certified mill reports indicating chemical and physical properties.

2) High-strength bolts of each type, including nuts and washers.

2. Supplier Instructions:

a. Installation data, handling, and storage instructions.

3. Source Quality Control Submittals:

a. When performed or when required by Engineer, submit results of source quality control testing and inspections performed at the mill or shop.

4. Field Quality Control Submittals:

a. Written field survey reports for all bearing surfaces surveyed, verifying tolerance requirements, areas out of tolerance, and corrective measures required.

5. Qualifications Statements.

a. Land surveyor.

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage:

1. Protect steel members and packaged materials from corrosion and deterioration.

2. Do not store materials in or on the building or structure in manner that may cause distortion or damage to structural steel members, building, or supporting structures.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Steel Types:

1. W-Shapes and WT-Shapes: ASTM A992/A992M.

2. S-shapes and Channels: ASTM A36.
3. Hollow Structural Sections: ASTM A1085 or ASTM A500/A500M, Grade B.
4. Angles, Plates, and Bars: ASTM A36/A36M.
5. Steel Pipe: ASTM A53/A53M, Grade B.

B. Anchorages, Fasteners, and Connectors:

1. Anchorage Devices: Refer to Section 05 05 33, Anchor Systems.
2. Headed Stud Type Shear Connectors: ASTM A108, Grades 1010/1020, complying with AWS D1.1/D1.1M, Section 7.
3. High-Strength Threaded Fasteners: Heavy hexagonal structural bolts, heavy hexagon nuts, and hardened washers, as follows:
    a. Unless otherwise indicated, fasteners shall be quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325, Type I, nuts complying with ASTM A563C, A563DH or A194/A194M 2H, and hardened washers complying with ASTM F436. Bolts, nuts and washers shall be hot-dip galvanized where shown or indicated.
    b. Tension control bolts, when used, shall comply with ASTM F1852.
    c. Compressible washer-type direct-tension indicators, when used, shall comply with ASTM F959, Type 325.
4. Threaded Rod: Provide threaded rods with heavy hexagon nuts, and hardened washers, as follows:
    a. Interior and Dry Locations: Provide threaded carbon steel rods complying with ASTM A36, with heavy hex nuts complying with ASTM A563A, unless otherwise shown or indicated on the Drawings.
    b. Exterior, Buried, or Submerged Locations, or When Exposed to Wastewater: Provide stainless steel threaded rods complete with washers complying with ASTM F593, AISI Type 316, Condition A, with ASTM A194/A194M, Grade 8S (nitronic 60) stainless steel nuts. Other AISI types may be used when approved by Engineer.

C. Electrodes for Welding: E70XX complying with AWS D1.1/D1.1M.

2.02 FABRICATION

A. Shop Fabrication and Assembly:

1. General:
    a. Fabricate and assemble structural assemblies in the shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC 325, the Contract Documents, and as shown on approved Shop Drawings. Provide camber in structural members as shown or indicated.
    b. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize handling of materials for storage and minimize handling at the Site.
    c. Where finishing is required, complete the assembly, including welding of units, before commencing finishing operations. Provide finish surfaces of members exposed-to-view in the completed Work that are free of markings, burrs, and other defects.
2. Connection design:
    a. The design of framing connections and for any part of the steel framing structure not

specifically detailed on the Contract Drawings shall be completed by Contractor, per AISC 303 - Option 3, under the supervision of a professional engineer registered in the same state as the Site. Design loads are indicated on the Contract Drawings.

B. Connections:

1. Shop Connections:

a. Unless otherwise shown or indicated, shop connections may be welded or high-strength bolted connections. Welds shall be 3/16-inch minimum.

b. Where reaction values of beam are not shown or indicated, connections shall be detailed to support 70% of the total uniform load capacity tabulated in tables contained in part 10 of the AISC Manual for allowable loads on beams for the associated shape, span, and steel specified for the beam. Reaction used for design shall not be less than 6 kips.

c. Shop-welded connections shall be detailed to eliminate or minimize eccentricity in the connection.

d. End-connection angles fastened to webs of beams and girders, and the thickness of angles, size, and extent of fasteners or shop welds, shall comply with tables of "Framed Beam Connections" in AISC 325. Connections shall be two-sided, unless otherwise shown or indicated.

2. Field Connections:

a. Field connections, unless otherwise shown or indicated, shall be made with high-strength bolts, and shall be bearing-type connections.

b. Use field welding only where shown or indicated or where approved by Engineer.

3. High-Strength Bolted Construction:

a. Provide high-strength threaded fasteners in accordance with RCSC Specifications for Structural Joints using ASTM A325 or ASTM A490 Bolts.

b. High-strength bolt design shear values shall be as specified in AISC 325 for bolts with threads in the shear plane for bearing type connections, or as specified in this Section for slip-critical connections.

c. Bolted connections shown or indicated as "SC" shall comply with slip-critical connection requirements in RCSC Specifications for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

1) Faying surfaces shall have a Class A surface condition.

2) Slip-critical bolts shall be fully pre-tensioned to 70 percent of minimum specified tensile strength of the bolt using one of the following methods:

a) Turn of nut with matchmarking.

b) Twist-off tension control bolt (ASTM F1852).

c) Direct tension indicator washer (ASTM F959).

d. Minimum bolt diameter shall be 3/4-inch, unless otherwise shown or indicated.

4. Welded Construction: Comply with AWS D1.1/D1.1M for procedures, appearance, and quality of welds, and methods used in correcting defective welding Work.

a. Assemble and weld built-up sections by methods that produce true alignment of axes without warp.

5. Where rigid connections are required by stresses shown or indicated, provide web

shear reinforcement and stiffeners in accordance with AISC 360.

6. Moment connections shown but not detailed on the Drawings shall be detailed for bending moments and shears indicated on the Drawings.

C. Bracing:

1. Bracing for which stress is not shown or indicated shall have minimum two-bolt connection, or shop-welded connection of equivalent strength.

2. Vertical bracing and knee braces connecting to columns shall be on the centerline of columns, unless otherwise shown or indicated.

3. Knee braces shall be at 45-degree angle, unless otherwise shown or indicated.

4. Gussets shall be not less than 3/8-inch thick, unless otherwise shown or indicated.

D. Columns: Column shafts shall have finished bearing surface roughness not greater than 500 micro- inch in accordance with ASME B46.1, and ends shall be square within tolerances for milled ends in accordance with ASTM A6/A6M at the base and at splice lines.

E. Structural Tubing: Properly seal structural tubing to protect internal surfaces.

F. Holes and Appurtenances for Other Work:

1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on the approved Shop Drawings. If large block-outs are required and approved, reinforce the webs to develop specified shears. Provide threaded nuts welded to framing and other specialty items as shown or indicated to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 FINISHING

A. Surface Preparation and Shop Priming:

1. Structural steel shall be primed in the shop. For surface preparation and shop priming requirements refer to Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

2.04 SOURCE QUALITY CONTROL

A. Inspection and Testing at the Mill or Shop:

1. Perform fabricator's standard procedures for source quality control, including inspections and testing.

2. Materials and fabrication procedures shall be subject to inspection and tests in mill and shop, conducted by a qualified inspection laboratory. Such inspections and tests do not relieve Contractor of responsibility for providing the Work in accordance with the Contract Documents.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which the Work will be performed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 ERECTION

A. General: Comply with AISC 303, AISC 360, and the Contract Documents.

B. Checking of Lines and Elevations: Before proceeding with structural steel erection, furnish services of a qualified surveyor to check lines and elevations of concrete and masonry bearing surfaces, and locations of anchorage devices and similar devices. Immediately report discrepancies to Engineer. Do not proceed with erection until defective Work that will support structural steel is corrected, including agreeing with Engineer upon compensating adjustments (if any) to structural steel Work.

C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy-lines to achieve proper alignment of structures as erection proceeds.

D. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete the Work. Provide sufficient planking to comply with Laws and Regulations, and provide tightly-planked substantial floor within two stories or 30 feet, whichever is less, below each tier of steel beams on which work is performed.

E. Anchorage Devices:

1. Provide anchorage devices, including anchor bolts, and other connectors required for securing structural steel to foundations and other in-place construction.
2. Provide templates and other devices necessary for presetting anchorage devices to accurate locations.
3. Refer to Section 05 05 33, Anchor Systems, for anchorage requirements.

F. Setting Bases and Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
2. Set loose and attached base plates and bearing plates for structural members on steel wedges or other adjusting devices.
3. Tighten anchorage devices after supported members are positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
4. Place grout between bearing surfaces and bases or plates in accordance with Section 03 60 00, Grouting. Finish exposed surfaces, protect installed materials, and allow to cure in accordance with grout manufacturer's instructions, and as otherwise required.
5. Do not use leveling plates or wood wedges.

G. Field Assembly:

1. Set structural frames accurately to the lines and elevations shown and indicated. Align and adjust the various members forming part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2. Level and plumb individual members of structure within tolerances as specified in AISC 325. For members requiring accurate alignment, provide clip angles, lintels, and other members, with slotted holes for horizontal adjustment at least 3/8-inch in each direction, or more when required.
3. Splice members only where shown or indicated.

H. Erection Bolts: On exposed-to-view, welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

I. Connections:

1. Comply with AISC 325 for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to field welds.

2. Do not enlarge inadequate holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas-cutting torches for correcting fabrication defects in structural framing. Cutting will be allowed only on secondary members that are not under stress, as approved by Engineer. Finish gas-cut sections equal to a sheared appearance, when allowed.

K. Touch-up Painting:

1. Unless otherwise specified, comply with touch-up painting requirements in Section 09 90 01, Coating Systems for Wastewater Treatment Plants.
2. Immediately after erection, clean field welds, bolted connections, and damaged or abraded areas of shop-applied paint. Apply paint to exposed areas with the same paint or coating material applied in the shop. Apply by brush or spray to provide not less than the dry film thickness specified in Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

3.03 FIELD QUALITY CONTROL

A. Site Tests and Inspections: Materials and erection procedures shall be subject to inspection and tests at the Site conducted by qualified inspection laboratory. Such inspections and tests do not relieve Contractor of responsibility for providing the Work in accordance with the Contract Documents.

1. Owner will engage independent testing and inspection laboratory to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
    a. Testing laboratory shall conduct and interpret tests, prepare and state in each report of results whether test specimens comply with the Contract Documents and specifically indicate all deviations.
    b. High-strength Bolted Connections: Each high-strength bolted connection shall be visually inspected. Inspection shall identify whether the Work complies with Sections 2, 3, and 8 of RCSC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
        1) For connections that are slip-critical or subject to axial tension, inspector shall verify proper pre-tensioning.
        2) For connections that are not slip critical and not subject to direct tension, bolt does not need to be inspected for bolt tension, but shall be visually inspected to verify that plies of connected elements are in snug contact.
        3) Where bolts or connections are defective, correct defective workmanship, remove and replace, or correct as required defective bolts and connections. Contractor shall pay for correcting defective Work and tests required to confirm integrity of corrected Work.
    c. Welds: Each weld shall be visually inspected.
        1) Where visually defective welds are evident, further test welds using non-destructive methods. If welds are determined to be acceptable, Owner will pay for non-destructive testing. When welds are defective, Contractor shall pay for non-destructive testing.
        2) Correct, or remove and replace, defective Work as directed by Engineer.
        3) Contractor shall pay for corrections and subsequent tests required to determine weld compliance with the Contract Documents.

END OF SECTION

SECTION 05 31 13 – STEEL FLOOR DECKING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install steel floor decking.
2. Decking Work shall include metal cover plate and metal closure strips. The Work also includes:
    a. Cutting of openings to accommodate the Work under this and other Sections, and providing for the steel floor decking all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the steel floor decking Work.

Related Sections:

2. Section 03 11 00, Concrete Forming.
3. Section 05 12 00, Structural Steel Framing.
4. Section 05 31 23, Steel Roof Decking.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AISI, Specification for the Design of Cold-Formed Steel Structural Members.
2. ASTM A36/A36M, Specification for Carbon Structural Steel.
3. ASTM A446/A446M, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
4. ASTM A525, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
5. ASTM A526/A526M, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
6. ASTM A611, Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled.
7. ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924/A924M, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM B633, Specification for Electro-Deposited Coatings for Zinc on Iron and Steel.
10. AWS D1.3, Structural Welding Code- Sheet Steel.
11. MIL-P-21035, Paint, High Zinc Dust Content Galvanizing Repair.
12. Steel Deck Institute, (SDI).

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of five years' experience producing substantially similar products and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of the component manufacturer from a single metal floor decking manufacturer.

2. The metal floor decking manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the metal floor decking manufacturer.

C. Unless otherwise specified or shown, fabrication and erection shall be in accordance with the current edition of the American Iron and Steel Institute's "Light Gauge Steel Design Specification." Steel deck shall be delivered, stored, handled and installed in such a manner that it will not be damaged or deformed.

D. Design of Decking and Connections:

1. All details shown are typical; similar details apply to similar conditions, unless otherwise shown or specified.

2. Verify dimensions at the Site without causing delay in the Work.

E. Qualification for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS D1.3, Structural Welding Code-Sheet Steel.

2. Provide certification that all welders employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within the previous 12 months. Contractor shall ensure that all certifications are kept current.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Roof deck load tables that show uniform loads capacity and diaphragm shear strengths for appropriate deck, span conditions, fastening system as well as provide the section properties for the specified deck.

b. Layout and anchorage details at every condition requiring closure strips, plates, sump pans, special jointing or other accessories.

c. Erection drawings, including deck cross-section, adaptations around openings and other special conditions, which details the method of welding sections to supporting structural steel, procedure for attaching end closure plates and butt joint cover plates, and miscellaneous flashing.

B. Informational Submittals: Submit the following:

1. Certificates:

a. Copies of welder's certifications.

2. Site Quality Control Submittals:

a. Submit results of testing and inspection performed at the Site by testing agency

employed by Contractor.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Compute the properties of metal floor deck sections based on the effective design width as limited by the provisions of the AISI Specifications. Provide not less than the deck section properties shown, including section modulus and moment of inertia per foot of width.

B. Provide floor deck units listed in Underwriters Laboratories "Fire Resistance Index", with each metal floor deck unit bearing the UL Labels and marking.

2.02 MATERIALS

A. Steel for Galvanized Finish: ASTM A611 or ASTM A653/A653M with a minimum yield point of 33,000 psi.

B. Miscellaneous Steel Shapes: Refer to Section 05 12 00, Structural Steel Framing.

C. Galvanizing: ASTM A 653/A 653M, coating class G90 and also complying with UL Standard for cellular units to be used as electrical raceways.

D. Sheet Metal Accessories: ASTM A611 and ASTM A653/A653M, commercial quality galvanized, and of the same quality as the floor deck steel.

E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035.

F. Mechanical Fasteners: Anchorage of the steel deck units to the supporting steel using powder actuated and pneumatic fasteners is an acceptable attachment method as equal to welding. The mechanical fasteners if used shall comply as follow:

1. Design Requirements: Conform to SDI Design Requirements. The type and spacing of the fastener shall be equal to or greater than the specified puddle weld method specified. Documentation in the form of test data, design calculations, or design charts shall be submitted by the fastener manufacturer as a basis for obtaining approval for this method of attachment

2. Material: Carbon steel wire suitable for hardening.

3. Hardness: Minimum 54.5 Rockwell.

4. Tensile Strength: 285,000 psi.

5. Shear Strength: 175,000 psi
6. Shape and Manufacturing Process: Knurled shank, forged point. Manufacturing process shall include steps to assure the ductility and quality of the fastener.
7. Washer Diameter: Nominal 1/2-inch diameter.
8. Finish: Zinc-coated conforming to ASTM B 633, Sc. 1, Type III.
9. Products and Manufacturers: Provide one of the following.
    a. Pneumatic Fasteners by Hilti, Inc.
    b. Pneumatic Fasteners by Pneutek.

2.03 FABRICATION

A. General: Form deck units in lengths to span three or more supports with flush ends and nesting side laps, unless otherwise shown. Provide deck configurations complying with SDI "Basic Design Specifications," and as specified herein.

B. Composite Steel Floor Deck Units:

1. Fabricate composite steel floor deck units of not less than 18-gauge steel sheets, with a fluted section having interlocking side laps, of the depth and coverage as shown.
2. Products and Manufacturers: Provide one of the following:
    a. Composite Floor Deck, as manufactured by Canam Steel Corporation.
    b. Composite Floor Deck, as manufactured by Vulcraft, A Division of Nucor Corporation.
    c. Or equal.

C. Steel Cover Plates and Pour Stops:

1. Fabricate steel cover plates for end-abutting floor deck units of not less than 18-gauge sheet steel of the same quality as the deck units. Form to the configuration to match the contour of the floor deck units and approximately 6-inches wide.

D. Steel Closure Strips:

1. Fabricate steel closure strips, for cell raceways and openings between floor deck and other construction. Form to the configuration required to provide tight-fitting closures at open ends of cells or flutes and side of the floor deck.

E. Accessories:

1. Provide all required accessories, such as hanger clips, required for a complete installation.

PART 3 – EXECUTION

1.01 INSPECTION

A. Contractor shall examine the areas and conditions under which the Work is to be performed and notify Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

1.02 INSTALLATION

A. General: Install floor deck units and accessories in accordance with the manufacturer's recommendations, approved Shop Drawings, and as specified herein.

B. Placing Floor Deck Units:

1. Place floor deck units on supporting steel framework and adjust to final position with ends accurately aligned. Before being permanently fastened, ensure that bearing on supporting members is not less than 3-inches. Do not stretch or contract the side lap interlocks. Place floor deck units in straight alignment for the entire length of run of cells and with close alignment between cells at ends of abutting floor deck units.
    a. Do not place deck units on concrete supporting structure until concrete has cured properly and is dry.
2. In locating decking bundles, assure no overloading of structural members.
3. Do not use floor deck units for storage or working platforms until permanently secured.

C. Fastening Deck Units:

1. Steel deck units shall be fastened to steel framework by the arc welding process or approved powder actuated fasteners.
2. Welds shall be free of sharp points or edges. All welds shall be cleaned immediately, by chipping or wire brushing, and shall be coated with zinc dust type primer paint.
3. Welding shall be done by qualified welders following AWS D1.3 procedures and standards.
4. Deck units shall be welded to the steel supporting member by 5/8-inch diameter fusion area puddle welds at 12-inches on center, unless otherwise shown.
5. Deck units shall be welded to parallel framing supports with 5/8-inch diameter fusion area puddle welds at 12-inches on center, unless otherwise shown.
6. Deck units shall be welded to sidelaps with 5/8-inch diameter fusion area puddle welds at mid- span, unless otherwise shown
7. Deck units shall be welded to perimeter edge supports with 5/8-inch diameter fusion area puddle welds at 12-inches on center, unless otherwise shown.
8. Weld all connection angles and plates to supporting members and deck with 1/2-inch diameter fusion welds at 12-inches on center, unless otherwise shown.
9. Any weld found to be defective shall be replaced before concrete is placed.
10. For powder actuated and pneumatic fastener attachment method comply with the manufacturer's requirements for installation procedures and power-actuated tool.

D. Cutting and Fitting:

1. Cut and fit floor deck units and accessories around other work projecting through or adjacent to the floor decking, as shown. Provide neat, square and trim cuts.

E. Reinforcement at Openings:

1. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work.
2. Reinforce floor decking around openings 6-inches to 12-inches in size by means of a flat galvanized steel sheet placed over the opening on the top of floor decking and fusion welded to the surface of the deck. Provide not less than 18- gauge steel sheet of the same quality as the deck units, at least 12-inches wider and longer than the opening, unless otherwise indicated. Space welds at each corner and not more than 12-inches on center along each side.

F. Hanger Slots or Clips:

1. Locate at not more than 24-inches on center in both directions, not over 9-inches from walls

at ends, and not more than 12-inches from walls at sides, unless otherwise shown.

2. Provide manufacturer's standard hanger attachment devices.

G. Joint Covers:

1. Provide metal joint covers at abutting ends of floor deck units, except where taped joints are required.

H. Steel Closures:

1. Provide steel closures for open ends of cell raceways at openings, columns, walls and other building construction and to close openings between deck and other construction. Tack weld into position to provide a complete deck installation.

I. Touch-Up Painting:

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with the manufacturer's instructions.

2. After floor deck installation, wire brush, clean and paint scarred areas, welds and rust spots on the top and bottom surfaces of deck units and supporting steel members.

3. Comply with all requirements for finish painting as specified in Section 09 90 01, Coating Systems for Wastewater Treatment Plants

1.03 FIELD QUALITY CONTROL

A. Owner will engage an independent testing and inspection agency to inspect welded connections and to perform tests and prepare test reports.

1. All welds will be subject to visual inspection. Where visually deficient welds are observed, the welds will be tested using non-destructive methods by a certified testing laboratory. If welds are found to be satisfactory, Owner will pay for testing. Where welds are found unacceptable or deficient, Contractor will pay for testing. Contractor will correct improper workmanship, remove and replace, or correct as instructed, all welds found unacceptable or deficient. Contractor will pay for all corrections and subsequent tests required to confirm the integrity of the weld.

2. Correct deficiencies in steel floor deck work, which inspection and laboratory test reports indicate do not comply with these Specifications. Perform additional tests, as may be necessary to reconfirm any non-compliance of the original Work, and as may be necessary to show compliance of corrected Work.

END OF SECTION

SECTION 05 31 23 – STEEL ROOF DECKING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install galvanized steel roof decking.
2. Steel roof decking Work shall include all incidentals required to complete the Work. The Work also includes:
    a. Cutting and flashing of openings to accommodate the Work under this and other Specification Sections, and providing for the steel roof decking all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Specification Sections and coordinate the installation of items to be installed with or before steel roof decking Work.

C. Related Sections:

1. Section 05 12 00, Structural Steel Framing.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members, with Supplements.
2. ANSI/SDI RD1.0, Steel Roof Deck.
3. ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel
5. ASTM C1513 Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
6. ASTM F1941, Specification for Electrodeposited Coatings on Threaded Fasteners (Unified Inch Screw Threads (UN/UNR))
7. AWS D1.3/D1.3M, Structural Welding Code – Sheet Steel.
8. ICC-ES AC43, Acceptance Criteria for Steel Deck Roof and Floor Systems.
9. ICC-ES AC70, Acceptance Criteria for Fasteners Power Driven Into Concrete, Steel, and Masonry Elements.
10. ICC-ES AC118, Acceptance Criteria for Tapping Screw Fasteners.
11. MIL-P-21035B, Paint, High Zinc Dust Content Galvanizing Repair.
12. SAE J78, Steel Self-Drilling Tapping Screws.
13. SDI MOC2, Manual of Construction with Steel Deck.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
    a. Manufacturer shall have not less than five years' experience producing products substantially similar to those required and, upon Engineer's request, shall submit evidence of not less than five installations in satisfactory operation for not less than five years each.
2. Erector:
    a. Engage an experienced erector to perform the Work of this Section who has specialized in erecting and installing steel roof decking similar to that required for the Project and who is acceptable to the steel roof decking manufacturer.
    b. Submit name and qualifications to Engineer, with the following information for not less than three successful, completed projects:
        1) Names and telephone numbers of owners, and architects or engineers responsible for each project.
        2) Approximate contract cost of the steel roof decking work.
        3) Area of roof decking installed.
3. Welders and Welding Processes:
    a. Qualify welding processes and welding operators in accordance with AWS D1.3/D1.3M.
    b. Submit certification that each welder employed on or to be employed for the Work possesses current AWS certification in the welding process with which welder will be working. Certifications shall be current and valid throughout the Work.

B. Component Supply and Compatibility:
1. Obtain all products required in this Section, regardless of component manufacturer, from a single steel roof decking manufacturer.
2. Steel roof decking manufacturer shall prepare, or review and approve, all Shop Drawings and other submittals for components furnished under this Section.
3. Components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by steel roof decking manufacturer.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:
1. Shop Drawings:
    a. Erection drawings showing the extent of coverage of each section of metal deck. Show deck cross section, size and spacing of welds to supports, side laps, and end laps. Show adaptations around openings and other special conditions that detail the method of fastening sections to supporting construction, the procedure for attaching end closure plates and butt joint cover plates, miscellaneous flashing, and accessories.
    b. Listing of all mechanical fastener products proposed for use in the Work including product type, and intended location in the Work.
2. Product Data:
    a. Manufacturer's catalogs, literature, specifications, load tables, and dimension diagrams for the following:
        1) Steel Deck and accessories; including load tables that indicate uniform load capacities and diaphragm shear strengths for the appropriate deck, span conditions,

and fastening system. Include the section properties for the specified deck.

2) Mechanical Fasteners: Including acceptable base material conditions and thickness ranges for each type of fastener, copies of valid ICC-ES reports that provide evaluation criteria, load carrying capacities and installation requirements.

3. Samples:

a. Steel Deck: Submit Sample, 12 inches by 12 inches, of each type of deck proposed for use in the Work.

b. Mechanical Fasteners: Representative Samples of mechanical fasteners proposed for use in the Work.

c. Review will be for type and finish only. Compliance with other requirements is exclusive responsibility of Contractor.

B. Informational Submittals: Submit the following:

1. Field Quality Control Submittals:

a. Reports by testing laboratory in accordance with Paragraph 3.3 of this Section.

2. Qualifications Statements: As specified in Paragraph 1.3.A of this Section for the following:

a. Manufacturer, when requested by Engineer.

b. Erector.

c. Welders and welding processes.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. System Description:

1. Provide steel roof decking systems at the locations shown on the Drawings.

2. Deck configuration is indicated in Paragraph 2.3.A of this Section.

B. Design and Performance Criteria:

1. Unless otherwise shown or indicated, material, fabrication and erection shall be in accordance with AISI S100 and ANSI/SDI RD1.0.

2. Determine the properties of steel roof deck sections on the basis of the effective design width as limited by AISI S100. Provide not less than the deck section properties shown, including section modulus and moment of inertia per foot of width.

2.02 MATERIALS

A. Galvanized Steel Sheet:

1. Material: ASTM A653/A653M, structural steel, with yield strength of not less than 33 ksi.

2. Zinc Coating shall be G60 on each side.

3. Minimum nominal thickness before coating shall be 20-gage, unless otherwise indicated.

B. Deck shall have sheet lengths that are continuous over three or more spans, wherever practicable.

C. Accessories shall be formed of the same material used for the steel deck.

D. Miscellaneous Steel Shapes: Refer to Section 05 12 00, Structural Steel Framing.

E. Galvanizing Repair Paint: High zinc-dust content paint for repairing damaged galvanized surfaces. Paint shall be in accordance with MIL-P-21035B.

F. Flexible Closure Strips for Deck: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

G. Mechanical Fasteners: Anchorage of the steel deck using mechanical fasteners, either powder actuated, pneumatically driven, or screws, will be allowed in lieu of welding, when the fasteners comply with the following:

1. Design Requirements: Comply with ANSI/SDI RD1.0. Type and spacing of fastener shall be equal to or greater than the puddle weld method shown or specified. Documentation in the form of ICC-ES reports, test data, diaphragm design tables or design charts shall be submitted by the fastener manufacturer as a basis for obtaining approval for this method of attachment.

2. Powder-Actuated and Pneumatic Fasteners:

   a. Fasteners shall have a current evaluation report by ICC-ES for use in fastening metal deck to steel substrate, as tested and assessed in accordance with ICC-ES AC43, and ICC-ES AC70.

   b. Products and Manufacturers: Provide one of the following.

      1) X-ENP-19 L15, X-END19 THQ 12, X-ENDK22 THQ 12 Powder Actuated Fasteners, by Hilti, Inc.

      2) K65056, K65062, SD65075, K64062, SDK63075 Air/Safe Fastening System, by Pneutek.

      3) Or equal.

   c. Substrate: Do not use powder-actuated or pneumatically-driven fasteners if supporting structural steel substrate is less than 1/8-inch thick.

   d. Material: Hardened carbon steel.

   e. Hardness: Minimum 52 Rockwell.

   f. Shape and Manufacturing Process: Knurled shank, forged point. Manufacturing process shall include steps to ensure fastener ductility and quality.

   g. Shank Diameter: 0.145-inch minimum.

   h. Head/Washer Diameter: Nominal 1/2-inch minimum.

   i. Finish: Zinc-coated complying with ASTM B633, Sc. 1, Type III.

3. Self-Drilling Self Tapping Screws:

   a. Fasteners shall have a current evaluation report by ICC-ES for use in fastening metal deck side laps, as tested and assessed in accordance with ICC-ES AC43 and ICC-ES AC118.

   b. Products and Manufacturers: Provide one of the following.

      1) S-SLC 01 M HWH, S-SLC 02 M HWH Side Lap Connectors, by Hilti, Inc.

      2) Grabber Self Drilling Screws, by John Wagner Associates, Inc.

      3) Or equal.

   c. Manufacture screws from heat-treated steel wire. Comply with SAE J78 and ASTM C1513.

   d. Substrate: Do not use screw fasteners if the supporting structural steel substrate is greater than 1/8 inch thick.

   e. Material: Carbon steel.

f. Size: Provide number 10 screws for deck gages 22 thru 26, number 12 screws for thicknesses greater than 22 gage.

g. Finish: Zinc-coated in accordance with ASTM F1941.

2.03 FABRICATION

A. General:

1. Form deck units in lengths to span three or more supports with flush, telescoped or nested two- inch end laps and nesting side laps, unless otherwise shown. Provide deck configurations complying with SDI MOC2, and as specified in this Section.

B. Wide-Rib Deck:

1. Depth: Approximately 1.5 inches; ribs spaced approximately six inches on centers; width of rib opening at roof surface not more than 2.5 inches; width of bottom rib surface not less than 1.75 inches.

2. Products and Manufacturers: Provide one of the following:

a. Type B Roof Deck, by Vulcraft, a Division of Nucor Corporation.

b. Type B Roof Deck, by Metal Deck Group, a Division of Consolidated Systems, Inc.

c. Type B Roof Deck, by DACS, Inc.

d. Or equal.

C. Roof Sump Pans:

1. Fabricate each from one piece galvanized sheet steel, not less than 14-gage thickness, of the same quality as deck units, with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown.

2. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than three inches wide.

3. Recess pans not less than 1.5 inches below roof deck surface, unless otherwise shown or required by deck configuration.

4. Holes for drains shall be cut in the field.

D. Cant Strips:

1. Fabricate cant strips of galvanized sheet steel, not less than 20-gage thickness, of the same quality as the deck units.

2. Bend cant strips to form a 45-degree cant not less than five inches wide, with top and bottom flanges not less than two inches wide, unless otherwise shown.

3. Provide cant strips in ten-foot lengths, where possible.

E. Ridge and Valley Plates:

1. Fabricate ridge and valley plates of galvanized sheet steel, not less than 20-gage thickness, of the same quality as the deck units; each leg not less than 2.25 inches wide, bent to provide tight-fitting closure with deck units.

2. Provide plates in ten-foot lengths, where possible.

F. Steel Filler and Closure Strips:

1. Fabricate steel closure strips of galvanized sheet steel, not less than 20-gage thickness, of same quality as the deck units.

2. Form to the configuration required to provide tight-fitting closures at open ends and sides of decking.

G. Venting:

1. To ensure positive venting from the underside, provide factory-slotted or perforated steel roof deck to receive insulation system. Coordinate venting requirements with insulating material manufacturer.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Install roof deck units and accessories in accordance with manufacturer's recommendations, and approved Shop Drawings and other approved submittals, and in accordance with the Contract Documents.

2. Install deck in a continuous operation to avoid delaying the construction.

B. Placing Roof Deck Units:

1. Place roof deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before permanently fastening. Lap ends not less than two inches. Do not stretch or contract the side-lap interlocks. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

a. Do not place deck units on concrete or masonry supporting structure until concrete or masonry has cured properly and is dry.

2. Form deck sheet at longitudinal sides in such manner that sides will overlap and interlock, and preclude the possibility of the dripping of cement paste from the concrete placed on it. End laps shall occur over bearings only.

3. Coordinate and cooperate with structural steel erector in locating deck bundles to prevent overloading of structural members

4. Do not use deck units for storage or working platforms until permanently secured.

5. Steel deck shall provide a continuous uniform slope, with practically flush top surfaces, and shall be installed in straight and continuous rows, as far as practicable, with ribs at right angles to the supporting members.

6. Erect and properly align deck prior to fastening deck to supporting steel.

C. Fastening Deck Units: Fasten steel deck units to steel framework by the arc-welding process or with approved mechanical fasteners.

1. Welding:

a. Welds shall be free of sharp points and edges. Clean welds immediately, by chipping or wire brushing, and coat welds with zinc dust type primer paint.

b. Welding shall be performed by qualified welders in accordance with AWS D1.3.

c. Weld deck units to the steel supporting members using the welding pattern shown.

d. Weld deck units to the steel supporting members by 5/8-inch diameter fusion area puddle welds at each deck rib, unless otherwise shown.

e. Weld deck units to parallel framing supports with 5/8-inch diameter fusion area puddle welds at 12 inches on centers, unless otherwise shown.

f. Weld deck units at sidelaps with 5/8-inch diameter fusion area puddle welds at mid-span, unless otherwise shown.

g. Weld deck units to perimeter edge supports with 5/8-inch diameter fusion area puddle welds at 12 inches on centers, unless otherwise shown.

h. Weld connection angles and plates to supporting members and deck with 5/8-inch diameter fusion welds at 12 inches on centers, unless otherwise shown.

i. Before insulation is installed, replace welds found to be defective.

2. Mechanical Fastening:

a. Comply with manufacturer's requirements for installation procedures for mechanical fastener attachment methods.

b. Fasten deck units to the steel supporting members using the fastener pattern shown.

c. Fasten deck units to the steel supporting members with specified fasteners at each deck rib, unless otherwise shown.

d. Fasten deck units to parallel framing supports with specified fasteners at 12 inches on centers, unless otherwise shown.

e. Fasten deck units at sidelaps with specified self-drilling screws at 12 inches on centers, unless otherwise shown.

f. Fasten deck units to perimeter edge supports with specified fasteners at 12 inches on centers, unless otherwise shown.

g. Fasten connection angles and plates to supporting members and deck with specified fasteners at 12 inches on centers, unless otherwise shown.

h. Before insulation is installed, replace all fasteners found to be defective.

D. Cutting and Fitting:

1. Cut and fit roof deck units and accessories around other work projecting through or adjacent to the roof deck. Provide neat, square and trim cuts.

E. Reinforcing at Openings:

1. Provide additional steel reinforcing and closure pieces as required for strength, continuity of deck, and to support other work, unless otherwise shown.

2. Reinforce roof deck around openings less than 15 inches in any dimension by means of a flat steel sheet placed over the opening and fastened to the top surface of deck. Provide steel sheet of the same quality as deck units, not less than 20-gage thickness, and not less than 12 inches wider and 12 inches longer than the opening. Provide welds or mechanical fasteners at each corner and spaced not more than 12 inches on centers along each side.

F. Roof Sump Pans:

1. Place roof sump pans over openings provided in the roof deck and fasten to the top deck surface. Space fasteners or welds not more than 12 inches on centers with at least one attachment at each corner. Cut opening in the bottom of roof sump to accommodate drain size shown.

G. Cant Strips:

1. Fasten cant strips to the top surface of roof deck, and secure to wood nailers with galvanized steel screws, and to steel framing with welds or galvanized steel self-tapping screws. Space fasteners or welds at 12 inches on centers and lap end joints not less than three inches and secure with galvanized steel sheet metal screws.

H. Ridge and Valley Plates:

1. Fasten ridge and valley plates to the top surface of roof deck with welds or self-drilling screws. Lap end joints not less than three inches, with laps made in the direction of water flow.

I. Closure Strips:

1. Provide steel closure strips at open uncovered ends and edges of roof deck, and in the voids between deck and other construction. Fasten into position to provide a complete deck installation.

J. Roof Insulation Support:

1. Provide steel closure strips for supporting roof insulation where rib openings in the top surface of roof deck occur adjacent to edges and openings. Fasten closure strips into position.

K. Touch-up Painting:

1. After completion of roof deck installation, wire-brush clean and paint scarred and damaged areas, welds, and rust spots on supporting steel members in accordance with Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

2. Touch-up galvanized top and bottom surfaces of deck units with galvanizing repair paint applied in accordance with the paint manufacturer's instructions and recommendations.

3.03 FIELD QUALITY CONTROL

A. Owner will employ testing laboratory to inspect welded connections and to perform tests and prepare test reports.

1. All welds will be subject to visual inspection. Where visually deficient welds are observed, welds will be tested using non-destructive methods by certified testing laboratory. If welds are found to be satisfactory, Owner will pay for testing. Where welds are found unacceptable or deficient, Contractor will pay for testing. Contractor shall correct improper workmanship, remove and replace, or correct as instructed, welds found unacceptable or deficient. Contractor shall pay for corrections and subsequent tests required to confirm the integrity of the weld.

2. Correct deficiencies in steel roof deck Work that inspection and laboratory test reports indicate do not comply with the Contract Documents. Perform additional tests as required to confirm non-compliance of the original Work, and as may be necessary to demonstrate compliance of corrected Work.

3. Work not in compliance with the Contract Documents and, where the Contract Documents do not include detailed requirements, Work that is not in accordance with generally-accepted standards of the trade, will be deemed defective. All Work that is defective shall be corrected or replaced as directed by Engineer. Corrections, re-design, and replacement of defective Work shall be at Contractor's expense

END OF SECTION

SECTION 05 40 00 – COLD-FORMED METAL FRAMING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all professional services, labor, materials, equipment and incidentals as shown, specified and required to design, furnish and install cold-formed metal framing.
2. The extent of cold-formed metal framing work is generally shown on the Contract Drawings.
3. This Section includes the following:
   a. Load-bearing wall framing
   b. Non-load-bearing wall framing

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before cold-formed metal framing Work.

C. Related Sections:

1. Section 04 26 13, Masonry Veneer.
2. Section 05 05 33, Anchor Systems
3. Section 05 50 13, Miscellaneous Metal Fabrications.
4. Section 09 22 16, Non-Structural Metal Framing.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AISI D100, Cold-Formed Steel Design Manual.
2. AISI D110, Cold-Formed Steel Framing Design Guide.
3. AISI D112, Brick Veneer Cold-Formed Steel Framing Design Guide.
4. AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members.
5. AISI S240, North American Standard for Cold-Formed Steel Structural Framing.
6. AISI S400, North American Standard for Seismic Design of Cold-Formed Steel Structural Framing.
7. ASCE 7, Minimum Design Loads for Buildings and Other Structures
8. ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
9. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
10. ASTM A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
11. ASTM C1513, Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.

12. ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
13. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
14. ASTM E1190, Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.
15. AWS D1.3, Structural Welding Code-Sheet Steel.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer shall have a minimum of five years' experience producing substantially similar products and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
2. Professional Engineer:
    a. Engage a registered professional engineer legally qualified to practice in the same jurisdiction as the Site and experienced in providing engineering services of the kind indicated.
    b. Submit qualifications data.
    c. Responsibilities include:
        1) Carefully reviewing cold-formed metal framing performance and design criteria stated in the Contract Documents.
        2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to Engineer by Contractor.
        3) Preparing or supervising preparation of design calculations and related drawings, Shop Drawings, and comprehensive engineering analyses verifying compliance of cold- formed metal framing with requirements of the Contract Documents.
        4) Signing and sealing all calculations, design drawings, and Shop Drawings.
        5) Certifying that:
            a) it has performed the design of cold-formed metal framing in accordance with performance and design criteria stated in the Contract Documents, and
            b) said design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice
3. Installer:
    a. Engage a single installer skilled, trained and with documented experience in the erection of cold-formed metal framing systems with specific skill and successful experience in the erection of the types of components required.
4. Testing Laboratory:
    a. Retain the services of independent testing laboratory to perform testing and determine compliance with the Contract Documents of the materials specified in this Section.
    b. Testing laboratory shall comply with the requirements of Section 01 45 29.13, Testing Laboratory Services Furnished by Contractor, and demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated, in accordance

with ASTM E329.

5. Welders and Welding Processes:
   a. Qualify procedures and personnel according to AWS D1.3.
   b. Submit certification that each welder employed on or to be employed for the Work possesses current AWS certification in the welding process with which welder will be working. Certifications shall be current and valid throughout the Work

B. Component Supply and Compatibility:
   1. Obtain all products included in this Section regardless of the component manufacturer from a single cold-formed metal framing manufacturer.
   2. The cold-formed metal framing manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
   3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the cold-formed metal framing manufacturer.

C. Product Tests: Mill certificates or data from a qualified independent testing agency or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

E. Regulatory Requirements: Comply with applicable requirements of Laws and Regulations, including local building codes listed in Section 01 42 00, References. Fabricate and label structural cold- formed metal framing to comply with material verification and special inspection requirements of the governing Building Code and Authorities Having Jurisdiction at the Site

F. Mock-Ups:
   1. Before installing cold formed metal framing system, build mock-ups for each required form of construction to demonstrate aesthetic effects and qualities of materials and execution.
      a. Include wall panel assembly with veneer, window framing, and insulation with vapor retarder.
      b. Include all sealants at perimeter of window and joints of wall.
   2. Incorporate materials and methods of fabrication and installation that are identical with Project requirements.
   3. Obtain Engineer's acceptance of visual qualities, erection tolerances and workmanship demonstrated on the mock-ups before start of cold-framing system Work. Retain and protect mock-ups during construction as a standard for judging completed Work. Do not alter mock-up after approval by Engineer.
   4. Build as many mock-ups as necessary to achieve Engineer's acceptance of the cold-form framing systems. Disassemble rejected mock-ups and remove all components from Site. Do not incorporate rejected mock-up components into the Work. Accepted mock-ups may be incorporated into the finished Work.
   5. Cold-formed framing systems that do not meet the standard of workmanship approved on the approved mock-up shall be removed and replaced with new material.

G. Pre-installation Conference:

1. Prior to erection of cold-formed metal system components and associated Work, Contractor shall schedule and meet at the Site with installer of each component of associated Work, the installers of substrate construction to receive the cold-formed metal systems Work, the installers of other Work around cold-formed metal system that follows the cold-formed metal system Work, Engineer and other representatives directly concerned with performance of the Work. Review foreseeable methods and procedures related to the cold-formed metal system Work, including but not necessarily limited to, the following:

   a. Review Project requirements and the Contract Documents.

   b. Review required submittals, both completed and yet to be completed.

   c. Review status of mock-ups.

   d. Review construction schedule and availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.

   e. Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.

   f. Review procedures needed for protection of cold-formed metal systems during the remainder of the construction period.

   g. Review required inspection, testing, and certifying procedures.

2. Record the discussions of the conference and the decisions and agreements or disagreements reached, and furnish a copy of the record to each party attending.

3. Record all revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

4. Reconvene the meeting at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

   a. Detailed Shop Drawings for fabrication and erection showing in plan the location of products, elevations, and details for the cold-formed metal framing Work. Show all accessory items to provide a complete installation; reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work. Include details of all connections between all materials.

   b. Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.

2. Product Data:

   a. Supplier's published literature for cold-formed metal framing proposed for each type of cold-formed metal framing product and accessory proposed.

B. Delegated Design Submittals:

1. Design Data: Submit the following:

   a. Design Calculations:

1) Complete calculations for the cold-formed metal framing systems as one package with the Shop Drawings. Structural calculations shall include all specified performance criteria, required load cases and load combinations used in the design and resulting member forces, reactions, deflections, and other anticipated movements in the cold- formed metal framing system. The magnitude of reactions on supporting structures from all critical load combinations shall be tabulated separately. Critical load combinations used in the final sizing of members shall be emphasized. All calculations and assumptions shall be presented so that Engineer can easily follow the progress and logic of Contractor's professional engineer. The design analysis shall include the name and office phone number of the designer to answer questions during the shop drawing review.

2) Design calculations shall be signed, sealed, and dated by Contractor's professional engineer. State of professional engineer's registration, registration number, and name on seal shall be clearly legible.

C. Informational Submittals:

1. Certificates:

a. Certification by professional engineer that metal building system design is in accordance with performance and design criteria stated in the Contract Documents, and that design conforms to applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.

b. Tests and Evaluation Reports:

1) Material test reports: From a qualified testing laboratory indicating and interpreting material test results of cold-formed metal framing system components, for compliance with requirements specified, including but not limited to:

a) Steel sheet

b) Mechanical fasteners

c) Power-actuated fasteners

d) Vertical deflection clips.

e) Horizontal drift deflection clips

f) Structural clips and accessories

2) Research/Evaluation Reports: For cold-formed metal framing.

2. Manufacturer's instructions:

a. Indicate preparation requirements and assembly sequence.

b. Installation data.

3. Qualification Statements:

a. Manufacturer

b. Professional Engineer

c. Installer

d. Testing Laboratory

e. Welders and welding processes

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 – PRODUCTS

2.01 SYSTEM PERFORMANCE

A. System description, general:

1. Cold-formed metal systems include complete, integrated sets of components and assemblies capable of withstanding structural and other loadings and thermally induced movements, without failure. The system includes all components necessary to complete the Work in a manner that provides a completely functioning system, complying with requirements shown and specified, all requirements of manufacturer, and governing authorities having jurisdiction at the Site.

2. Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

3. In some cases, incidental accessories necessary to the proper functioning of the specified system may not be mentioned in the Specifications. Contractor shall follow the recommendations of the approved manufacturer and provide systems and components with all required incidental accessories and component items necessary for the proper functioning of the systems, at no additional expense to Owner. Provide materials matching the specified material and finish of similar items.

4. Provide specified material gages, or heavier gages, if calculations based on performance criteria indicate the need for heavier gage material. Where compliance with performance criteria indicates that materials of lesser gage, or size, may be adequate, provide specified gages and sizes as minimum acceptable standard.

5. Requirements for interior, non-load bearing, metal stud framing are in Section 09 22 16, Non- Structural Metal Framing.

B. Design Criteria:

1. Provide cold-formed metal framing systems capable of withstanding controlling effects of

gravity and lateral loads per the basic load and load combinations in accordance with Laws and Regulations. Comply with 2014 Indiana Building Code, ASCE 7, applicable AISI standards, specifications, and publications, except to the extent more stringent requirements are specified or required by governing authorities having jurisdiction at the Site.

2. Design Loads:

a. As indicated in the Drawings and in accordance with all governing building codes.

b. Site specific load factors for Snow, Wind and Seismic loads are indicated in the Contract Drawings.

3. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior wall framing or framing supporting masonry: Horizontal deflection of 1/600 of the wall height.

b. Design exterior wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

2.02 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. ClarkDietrich

2. Or equal.

2.03 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: Minimum ST33H; 33,000 ksi or as required by structural performance.

2. Coating: G60.

2.04 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.

2. Flange Width: Minimum 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch**.**

2. Flange Width: Manufacturer standard.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.

2. Flange Width: 1-5/8 inches.

2.05 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

2. Flange Width: 1-3/8 inches.

3. Depth: As required by manufacturer design and as indicated in the Drawings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.

2. Flange Width: Manufacturer standard.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 1 inch plus the design gap where applicable.

E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.06 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Gusset plates.
7. Stud kickers, knee braces, and girts.
8. End closures.
9. Backer plates.

2.07 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Expansion Anchors: Refer to Specification Section 05 05 33, Anchor Systems.

C. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.08 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, ASTM A780.

B. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

2.09 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true- to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 7, in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.04 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 12 inches, or as required to coordinate and align with masonry and stone anchors.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.

2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced 48 inches or as indicated in the Drawings**.** Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.

2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall- framing system.

3.05 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches, maximum, or as required to coordinate and align with masonry and stone anchors.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   a. Install solid blocking at 96-inch or as required by manufacturer design.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.06 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Engineer.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.07 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

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SECTION 054100 – METAL STUDS FOR INTERIOR WALLS

PART 1 – GENERAL

1.01 PRODUCT HANDLING

A. Protection: Use all means necessary to protect metal studs before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 METAL STUDS

A. Standards: All metal studs and accessories shall meet or exceed the minimum requirements of Federal Specifications QQS-698 and QQS-775d, class d, for the items and use intended.

B. Materials:

1. All metal studs and accessories, unless otherwise specifically approved by the Architects, shall be galvanized steel.
2. Studs and runners shall be channel-type, roll-formed 20 gauge (standard) size.
3. All furring channels shall be 25 gauge.
4. Steel runners and hangers shall be sizes as indicated on the Drawings.
5. Bridging requirements are to be designed by the supplier. Maximum spacing of bridging is to be 5'-0" o.c. All bridging is to be attached with gauge angles and screws. Minimum attachment to be 18 gauge short angle and (4) TEK screws.

2.02 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of metal studs, shall be new, first quality of their respective kinds, in strict accordance with the recommendations of the manufacturer of the metal studs used, and subject to approval of the Architect/Engineer.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that metal studs may be installed in strict accordance with the original design and the manufacturer's recommendations.

3.02 INSTALLATION

A. Erect framing and panels plumb, level and square in strict accordance with the approved shop drawings.

B. Handling and lifting of prefabricated panels shall be done in a manner which will not cause distortion in any manner.

C. Track shall be securely anchored to the supporting structure as shown on erection drawings. Concrete anchors shall be installed after full compressive strength has been achieved.

D. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt-welded or spliced together.

E. Studs shall be plumb, aligned and securely attached to the flange or webs of both upper and lower tracks.

F. Jack studs or cripples shall be installed below window sills, above window and door heads, at free standing stair rails and elsewhere to furnish support, and shall be securely attached to supporting members.

G. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the manufacturer's recommendations.

H. Framed wall openings shall include headers and supporting studs as shown on the plans.

I. Temporary bracing shall be provided until erection is complete.

J. Provisions for structure vertical movement shall be provided at the top of each panel section and where indicated on the plans using a vertical slide clip or other means in accordance with the manufacturer's recommendations. Allow for a minimum of 1/2" structure deflection.

K. Provide double studs at wall openings, door and window jambs and not more than 1 1/2" each side of openings and wall intersections.

L. Coordinate erection of studs with requirements of door frame supports and attachments.

END OF SECTION 054100

SECTION 05 50 13 – MISCELLANEOUS METAL FABRICATIONS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish miscellaneous metal fabrications including surface preparation and shop priming.
2. The Work also includes:
    a. Providing openings in miscellaneous metal fabrications to accommodate the Work under this and other Sections, and attaching to miscellaneous metal fabrications all items such as sleeves, bands, studs, fasteners, and all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the Work to be installed with, or attached to miscellaneous metal fabrications Work.
2. Hot-dip Galvanizing: Coordinate with steel fabricator detailing for and fabrication of assemblies to be hot-dip galvanized, to minimize distortion during galvanizing process.

C. Related Sections:

1. Section 03 60 00, Grouting.
2. Section 05 05 33, Anchor Systems.
3. Section 06 80 00, Fiber Reinforced Polymer (FRP) Ladders and Cages.
4. Section 06 82 10, Fiberglass Reinforced Grating.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI A14.3, Ladders – Fixed –Safety Requirements.
2. ANSI Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components.
3. ASTM A36/A36M, Specification for Carbon Structural Steel.
4. ASTM A53/A53M, Specification for Pipe Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
5. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A240/A240M, Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
8. ASTM A320/A320M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low- Temperature Service.
9. ASTM A384/A384M-02 Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

10. ASTM A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
11. ASTM A572/A572M, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
12. ASTM A793, Specification for Rolled Floor Plate, Stainless Steel.
13. ASTM A992/A992M, Specification for Structural Steel Shapes.
14. ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
15. ASTM B211, Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.
16. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
17. ASTM B308/B308M, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
18. ASTM B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
19. ASTM B632/B632M, Specification for Aluminum-Alloy Rolled Tread Plate.
20. ASTM C 177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
21. AWS D1.1/D1.1M, Structural Welding Code – Steel.
22. AWS D1.2/D1.2M, Structural Welding Code – Aluminum.
23. AWS D1.6, Structural Welding Code – Stainless Steel.
24. NAAMM, Metal Finishes Manual.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Welding:

a. Qualify welding processes and welding operators in accordance with AWS D1.1/D1.1M, D1.2/D1.2M, or D1.6, as applicable.

b. When requested by Engineer, provide certification that each welder employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

B. Regulatory Requirements: Conform to the following:

1. 29 CFR 1910, Occupational Health and Safety Standards.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Fabrication and erection details for assemblies of miscellaneous metal Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Include setting drawings and templates for locating and installing miscellaneous metal items and anchorage devices.

2. Product Data:

a. Copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions for products to be used in miscellaneous metal Work.

3. Samples:

a. Sets of representative Samples of materials including nosings, rungs, and other finished products as requested by Engineer. Engineer's review will be for color, texture, style, and finish only. Compliance with other requirements is exclusive responsibility of Contractor.

B. Informational Submittals: Submit the following:

1. Test and Evaluation Reports:

a. Mill test report that indicate chemical and physical properties of each type of material, when requested by Engineer.

2. Qualifications Statements:

a. Copies of welder's certifications, when requested by Engineer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in other construction in ample time to prevent delaying the Work.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Steel:

1. W-Shapes and WT-Shapes: ASTM A992/A992M.
2. S-Shapes and Channels: ASTM A572/A572M, Grade 50.
3. Hollow Structural Sections: ASTM A500, Grade B.
4. Angles, Plates, Bars: ASTM A36/A36M.
5. Steel Pipe: ASTM A53/A53M, Grade B.

B. Aluminum:

1. Aluminum Shapes: ASTM B308/B308M, Alloy 6061-T6, ASTM B 221, Alloy 6061-T6.
2. Aluminum Tubes and Pipes: ASTM B429, Alloy 6061-T6.
3. Aluminum Bars and Rod: ASTM B211, Alloy 6061-T6.
4. Aluminum Plates: ASTM B209, Alloy 6061-T6.

C. Stainless Steel:

1. Plates and Sheets: ASTM A240/A240M, Type 304L or Type 316 stainless steel.

2. Submerged or Intermittently Submerged: Type 316 stainless steel.
3. Non-submerged: Type 304L stainless steel.

D. Stainless Steel Fasteners and Fittings: ASTM A 320/A 320M, Type 304L or Type 316 Stainless Steel.

E. Zinc-coated Hardware: ASTM A153/A153M.

2.02 MISCELLANEOUS METAL ITEMS

A. Shop Assembly:

1. Pre-assemble items in the shop to the greatest extent possible to minimize field-splicing and field-assembly of units at the Site. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Aluminum Ladders:

1. Fabricate ladders for locations shown or indicated with dimensions, spacing, details, and anchorages as shown and specified. Comply with OSHA 29 CFR 1910 and ANSI A14.3, except

   as otherwise shown or specified.

   a. Unless otherwise shown, provide 1.5-inch diameter continuous side rails, spaced at least 1.5 feet apart.

   b. Provide extruded square rungs, spaced maximum of 12 inches on centers, with non-slip surface on top of each rung. Adhesive strips for non-slip surfaces are not acceptable.

2. Fit rungs in centerline of side rails, plug weld, and grind smooth on outer rail faces.
3. Support each ladder at top and bottom and at intermediate points spaced not more than five feet on centers.
4. Use welded or bolted brackets, designed for adequate support and anchorage, and to hold ladder clear of wall surface with minimum of seven inches between wall and centerline of rungs.
5. Unless otherwise shown or approved by ENGINEER, extend rails 3.5 feet above top rung, and return rails to wall or structure, unless other secure handholds are provided. If adjacent structure does not extend above top rung, goose-neck extended rails back to structure to provide secure ladder access.
6. Use extruded aluminum conforming to alloy and temper 6061-T6.
7. Where shown, provide FRP universal double bar ladder safety gate by Intrepid Industries or Equal mounted to existing ladder or surrounding railing.

C. Fall Prevention System:

1. Provide each ladder with a fall prevention system complying with 29 CFR 1910, ANSI A14.3, and ANSI Z359.1.
2. System shall consist of a carrier rail securely and permanently attached to ladder, over which travels a sleeve to which harness belt can be attached.
3. Products and Manufacturers: Provide products of one of the following:

   a. Saf-T-Climb by North Safety Products.

   b. Or equal.

4. Rail:
   a. Notched at six-inch intervals and constructed of galvanized steel.
   b. Provide ladder attachments/rail mounting brackets of same material as rail, and as required by Supplier.
   c. For all ladders, include provisions to secure safety sleeve to carrier rail at top of vertical ladder so that sleeve will not slide down rail when safety belt is unsnapped.
   d. Ladders Below Hatches: Rail for ladder shall extend from bottom of ladder to top of ladder. Provide telescoping safety post as specified in this Article.
   e. Ladders Not Below Hatches: Rail for ladder shall extend from bottom of ladder to above horizontal landing or roof at top of ladder, Provide removable extension section at top of ladder. Arrange rail to allow climber to land on landing or roof without unsnapping climber's safety harness
5. Accessories: Provide with each ladder the following, all furnished by fall prevention system Supplier:
   a. One safety sleeve compatible for use with the rail. Sleeve shall be cast bronze with five zinc-plated steel roller bearings. Sleeve shall travel smoothly on straight or curved rail.
   b. One safety harness that attaches to sleeve. Harness shall be of woven, high-strength nylon, with padded straps and forged steel buckles and rings. Harness shall distribute impact forces of a fall over climber's thighs, buttocks, chest, and shoulders.
   c. One shock-absorbing Y-lanyard no longer than six feet, complying with ANSI Z359.1. Lanyard shall be 5/8-inch diameter nylon rope with double-locking snap hooks at each end.

D. Safety Post:
1. Provide safety post for each fixed access ladder located below an access hatch. Safety post shall be manufactured of high-strength structural material with telescoping tubular section that locks automatically when fully extended.
2. Products and Manufacturers: Provide products of one of the following:
   a. LadderUP Safety Post by Bilco Company
   b. Or equal.
3. Use upward and downward movement of post shall be controlled by stainless steel spring balancing mechanism.
4. Safety post shall be hot-dip galvanized steel.

E. Safety Tie-Back Anchor:
1. Provide safety tie-back anchors as shown on the Contract Drawings.
2. Complete system shall consist of swivel top, anchor post, base plate and concrete fasteners.
3. Design Performance:
   a. Design and test personal fall arrest and restraint safety anchors as follows:
      1) Comply with OSHA 1926, Subpart M and 1910, ANSI Z359.18-17 and ANSI A10.32-12.

         Type A Anchorage Connector.

2) Fall arrest force against fracture or detachment: 5,000 pounds minimum, applied as indicated in the OSHA requirements.

3) Material: Carbon steel, hot dipped galvanized to ASTM A123/A123M.

4) Top: Swivel Top.

b. Manufacturer shall provide entire suite of PFAS (personal fall arrest system) equipment compatible with safety tie back anchor, including full body harness, shock absorbing lanyard and retractable lifeline, as necessary for the use conditions shown or specified.

4. Products and Manufacturers: Provide products of one of the following:

a. CB-12 Anchor Point, by Guardian Fall Protection

b. Or equal.

F. Steel Lintels:

1. Provide loose structural steel lintels for openings and recesses in masonry walls and brick walls as specified or as shown.

2. Weld adjoining members together to form a single unit, where shown or indicated.

3. Provide not less than eight inches bearing at each side of openings, unless otherwise shown.

4. Steel lintels to be installed in exterior walls shall be hot-dip galvanized and finish painted. Other steel lintels shall be painted.

5. Surface preparation and painting shall conform to Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

6. Where lintels are not shown on the Drawings, provide lintels as specified in the following table. Provide other lintels where shown and of size indicated on the Drawings.

Clear Span	Exterior Angle	Interior Angles (typical 8-inch wall)
4.0 feet	3.5 inches by 3.5 inches by 5/16 inches	Two 3.5 inches by 3.5 inches by 5/16 inches
6.0 feet	Four inches by 3.5-inches by 5/16 inches	Two 4 inches by 3.5 inches by 5/16 inches
8.0 feet	Five inches by 3.5 inches by 5/16 inches	Two 5 inches by 3.5 inches by 5/16 inches

G. Shelf Angles:

1. Provide structural steel shelf angles of sizes shown, for attachment to concrete or masonry construction. Provide slotted holes to receive 3/4-inch bolts, spaced not more than six inches from ends and not more than 2.0 feet on centers, unless otherwise shown.

a. Provide galvanized shelf angles on outdoor construction.

2. Provide wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

H. Aluminum Stair Nosings:

1. Manufacturers: Provide products of one of the following:

a. Supergrit Type 241BF by Wooster Products, Inc.

b. Or equal.

2. Fabricate extruded aluminum nosing of sizes and configurations as shown on the Drawings.

a. Unless otherwise shown, provide ribbed abrasive filled type, using black abrasive filler.

3. Provide anchors for embedding in concrete, either integral or applied to treads, as standard with manufacturer.

I. Weir Plates:

1. Provide weir plates as shown on the Drawings. Use 3/8-inch aluminum.

2. Aluminum plate shall conform to alloy and temper 6061-T6.

3. Provided slotted holes for fasteners to allow weir plate to be leveled.

4. Fastening devices shall be Type 316 stainless steel in accordance with Section 05 05 33 Anchor Systems.

J. Bollards:

1. Provide Schedule 40 galvanized steel pipe filled with concrete as shown on the Drawings. Paint as required in accordance with Section 09 90 01, Coating Systems for Wastewater Treatment Plants. Unless otherwise shown or specified, finish-paint bollard “Safety Yellow.”

K. Miscellaneous Framing and Supports:

1. Provide miscellaneous metal framing and supports that are not part of structural steel framework and are required to complete the Work. Miscellaneous framing and supports not shown on the Drawings shall be designed by Contractor’s professional engineer registered in the same state as the site. Professional engineer shall sign and seal all related drawings and calculations.

2. Fabricate miscellaneous units to sizes, shapes, and profiles shown on the Drawings or, if not shown, of required dimensions to receive adjacent grating, plates, tanks, doors, and other work to be retained by the framing.

3. Except as otherwise shown, fabricate from structural shapes, plates, and bars, of all-welded construction using mitered corners, welded brackets, and splice plates and minimum number of joints for field connection.

4. Cut, drill, and tap units to receive hardware and similar items to be anchored to the Work.

5. Furnish units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units are to be installed after concrete is placed.

a. Except as otherwise shown, space anchors, 2.0 feet on centers, and provide units the equivalent of 1.25-inch by 1/4-inch by eight-inch strips.

b. Galvanize exterior miscellaneous frames and supports.

c. Where shown or indicated, galvanize miscellaneous frames and supports that are not to be installed outdoors.

6. Miscellaneous steel framing and supports shall be hot-dip galvanized and finish-painted, unless otherwise shown or indicated.

7. For railings, refer to Section 05 52 15, Aluminum Handrails and Railing.

8. For grating requirements refer to Section 05 53 16, Aluminum Grating.

9. Surface preparation and painting of galvanized surface shall conform to Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

L. Fasteners and Hardware: Provide Type 316 stainless steel fasteners for aluminum fabrications and zinc-coated hardware for galvanized fabrications, unless otherwise shown or specified.

M. Anchors and Expansion Anchors: Refer to Section 05 05 33, Anchor Systems.

2.03 FINISHING

A. Surface Preparation and Shop Priming: Perform surface preparation and apply primer coat to miscellaneous metal fabrications in the shop. Conform to surface preparation and shop priming requirements in Section 09 90 01, Coating Systems for Wastewater Treatment Plants.

B. Galvanizing:

1. Galvanizing of fabricated steel items shall comply with ASTM A123/A123M.

2. Details of fabrication of steel items and assemblies to be hot-dip galvanized shall conform to recommendations of ASTM A384/A384M to minimize the potential for distortion.

C. Aluminum Finish: Provide natural mill finish for aluminum Work unless otherwise shown or specified.

2.04 SOURCE QUALITY CONTROL

A. Tests and Inspections:

1. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures complying with the Contract Documents.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions under which the Work is to be performed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install miscellaneous metal fabrications accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork where fabrications are to be built into concrete, masonry, or other construction.

B. Anchor securely as shown and as required for the intended use, using concealed anchors where possible.

C. Fit exposed connections accurately together to form tight, hairline joints. Field-weld steel connections that are not to be exposed joints and cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1/D1.1M, D1.2/D1.2M and D1.6, as applicable to the material being welded. Grind steel joints smooth and touch-up shop paint coat. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

D. Protection of Aluminum from Dissimilar Materials:

1. Coat surfaces of aluminum that will contact dissimilar materials such as concrete, masonry, and steel, in accordance with Section 09 90 01, Coating Systems for Wastewater Treatment

Plants.

END OF SECTION

SECTION 055800 – METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Types of metal fabrications include the following:

1. Rough hardware.
2. Loose steel lintels.
3. Miscellaneous framing and supports.
4. Miscellaneous steel trim.

1.02 SUBMITTALS

A. Product data indicating compliance with requirements for the following:

1. Grout.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts installed under other Sections.

C. Welder certificates signed by the Contractor and indicating that welders comply with requirements specified under "Quality Assurance" Article.

1.03 QUALITY ASSURANCE

A. Codes and Standards: AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings"; AWS "Structural Welding Code"; comply with applicable provisions.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code - Steel," AWS D1.2 "Structural Welding Code - Aluminum," and AWS D1.3 "Structural Welding Code - Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and if pertinent, has undergone recertification.

1.04 PROJECT CONDITIONS

A. Where field measurements cannot be made without delaying The Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.01 FERROUS MATERIALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, Bars: ASTM A 36.

C. Rolled Steel Floor Plates: ASTM A 786.

D. Steel Tubing: Product type (manufacturing method) as follows:

1. Cold-Formed Steel Tubing: ASTM A 500.
2. Hot Formed Steel Tubing: ASTM A 501.
    a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

E. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
1. Black finish, unless otherwise indicated.
2. Galvanized finish for exterior installations and where indicated.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.02 PAINT

A. Shop Primer for Ferrous Metals: Fast-curing, lead- and chromate-free universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664. Select paint for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats, despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC Paint 20.

2.03 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Provide fasteners as indicated on drawings, or if not indicated, select fasteners for the type, grade, and class required to provide a complete, secure installation.

2.04 GROUT AND ANCHORING CEMENT

A. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications. Subject to compliance with requirements, provide one of the following:
1. Hi Mod Grout; Euclid Chemical Co.
2. Embeco 885 and 636; Master Builders Technologies, Inc.
3. Ferrolith G Redi-Mix and G-NC; Sonneborn Building Products-ChemRex, Inc.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications. Subject to compliance with requirements, provide one of the following:
1. Construction Grout; W. R. Bonsal Co.
2. Sure-grip High Performance Grout; Dayton Superior Corp.
3. Euco N-S Grout; Euclid Chemical Co.
4. Five Star Grout; Five Star Products.
5. Vibropruf #11; Lambert Corp.
6. Crystex; L & M Construction Chemicals, Inc.

7. Masterflow 928 and 713; Master Builders Technologies, Inc.
8. Sealtight 588 Grout; W. R. Meadows, Inc.
9. Sonogrout 14; Sonneborn Building Products-ChemRex, Inc.

C. Interior Anchoring Cement:Factory-packaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only. Subject to compliance with requirements, provide one of the following:

1. Ankertite Cement; Dayton Superior Corp.
2. Por-Rok; Minwax Construction Products Division.

D. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer. Subject to compliance with requirements, provide one of the following:

1. Bonsal Anchor Cement; W.R. Bonsal Co.
2. Super Por-Rok; Minwax Construction Products Division.
3. Thorogrip; Thoro Systems Products.

2.05 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F.

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.06 ROUGH HARDWARE

A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.07 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.08 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

C. Toilet Partition Supports: Fabricate support for suspended toilet partitions as follows:

1. Beams: Continuous steel shapes as shown on drawings, or if not shown, of size required to limit deflection to L/360 between hangers, but use not less than C8 by 11.5 channels or another shape with equivalent structural properties.

2. Hangers: Steel rods as shown on drawings, or if not shown, 1/2-inch minimum diameter, spaced not more than 36 inches o.c. Thread rods to receive anchor and stop nuts. Fit hangers with wedge-shaped washers for full bearing on sloping flanges of support beam.

3. Braces and Angles: Steel angles of size required for rigid support of beam and for secure anchorage.

D. Galvanize miscellaneous framing and supports in exterior locations.

2.09 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in exterior locations.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."

2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.02 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.03 INSTALLING SUPPORTS FOR TOILET PARTITIONS

A. Anchor supports securely to and rigidly brace from overhead building structure.

3.04 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting."

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 055800

SECTION 061000 – ROUGH CARPENTRY

PART 1 – GENERAL

1.01 DESCRIPTION

A. Section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.02 RELATED WORK

A. Milled woodwork: Section 062000, FINISH CARPENTRY AND MILLWORK.

B. Gypsum sheathing: Section 092500, GYPSUM BOARD SYSTEM.

1.03 SUMBITTALS

A. Submit in accordance with Section 013200, SAMPLES AND SHOP DRAWINGS.

B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products to prevent warping.

D. Locate stacks on well drained areas, supported at least 6 inches above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.05 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA):

1. National Design Specification for Wood Construction WCD Number 1-01 Conventional Wood Frame Construction

C. American Institute of Timber Construction (AITC):

1. A190.1-92 Structural Glued Laminated Timber

D. American Society of Mechanical Engineers (ASME):

1. B18.2.1A-99 Square and Hex Bolts and Screws
2. B18.2.2-87 (R99) Square and Hex Nuts
3. B18.6.1-81 (R97) Wood Screws
4. B18.6.4-98 Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

E. American Plywood Association (APA):

1. E30-1996 Design/Construction Guide - Residential and Commercial

F. American Society for Testing And Materials (ASTM):

1. A47-99 Ferritic Malleable Iron Castings
2. A48-00 Gray Iron Castings

3. A653/A653M-00 Steel Sheet Zinc-Coated (Galvanized) or Zinc- Iron Alloy Coated (Galvannealed) by the Hot Dip Process
4. C954-00 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch to 0.112-inch in thickness
5. C1002-01 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
6. D143-(R00) Small Clear Specimens of Timber, Method of Testing
7. D1760-01 Pressure Treatment of Timber Products D2559-00 Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
8. D3498-01 Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems F844-00 Washers, Steel, Plan (Flat) Unhardened for General Use
9. F1667-01 Nails, Spikes, and Staples

G. U.S. Department of Commerce Product Standard (PS)

1. PS 1-95 Construction and Industrial Plywood
2. PS 20-70 (R86) American Softwood Lumber Standard
3. PS 58-74 Basic Hardboard

PART 2 – PRODUCTS

2.01 LUMBER

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

4. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
5. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA, National Design Specification for Wood Construction having design stresses as shown.

C. Lumber Other Than Structural:

1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
2. Framing lumber: Minimum extreme fiber stress in bending of 1100.
3. Furring, blocking, nailers and similar items 4 inches and narrower Standard Grade; and, members 6 inches and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 1 inch thick, not less than 8 inches wide.

D. Sizes:

1. Conforming to Prod. Std., PS20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. At time of delivery and maintained at the site.

2. Boards and lumber 2 inches and less in thickness: 19 percent or less.
3. Lumber over 2 inches thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.02 PLYWOOD

A. Comply with Prod. Std., PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

C. Sheathing:

1. APA rated Exposure 1 or Exterior; panel grade CD or better.
2. Wall sheathing:
   a. Minimum 11/32 inch thick with supports 16 inches on center and 15/32 inch thick with supports 24 inches on center unless specified otherwise.
   b. Minimum 48 inches wide at corners without corner bracing of framing.
3. Roof sheathing:
   a. Minimum 11/32 inch thick with span rating 24/0 or 15/32 inch thick with span rating for supports 16 inches on center unless specified otherwise.
   b. Minimum 19/32 inch thick or span rating of 40/20 or 23/32 inch thick or span rating of 48/24 for supports 24 inches on center.

D. Subflooring:

1. Under finish wood flooring or underlayment:
   a. APA Rated sheathing, Exposure 1. panel grade CD.
   b. Minimum 19/32 inch thick with span rating 32/16 or greater for supports at 16 inches on center and 23/32 inch thick with span rating 48/24 for supports at 24 inches on center.
2. Combination subflooring-underlayment under resilient flooring or carpet:

a. APA Rated Stud-I-Floor Exterior or Exposure 1, T and G.

b. Minimum 19/32 inch thick or greater, span rating 16, for supports at 16 inches on center; 23/32 inch thick or greater, span rating 24, for supports at 24 inches on center.

c. Minimum 3/4-inch thick or greater, span rating 32, for supports at 32 inches on center; 1-1/8 inch thick, span rating 48 for supports at 48 inches on center.

E. Underlayment:

1. APA rated Exposure 1 or Exterior, panel grade C-C Plugged.

2. Minimum 1/4 inch thick or greater over plywood subflooring and 3/8 inch thick or greater over board subflooring, unless otherwise shown.

2.03 STRUCTURAL-USE PANELS

A. Comply with APA.

B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.

C. Wall and Roof Sheathing:

1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 16 inches on center and 24/0 or greater for supports 24 inches on center.

D. Subflooring:

1. Under finish wood flooring or underlayment:

a. APA rated sheathing panels, durability classification of Exposure 1 or Exterior.

b. Span Rating of 24/16 or greater for supports 16 inches on center and 24 or greater for supports 24 inches on center.

2. Under resilient floor or carpet.

a. APA rated combination subfloor-underlayment grade panels, durability classification of Exposure 1 or Exterior T and G.

b. Span Rating of 16 or greater for supports 16 inches on center and 24 or greater for supports 24 inches on center.

E. Underlayment:

1. APA rated Exposure l.

2. Minimum 1/4 inch thick or greater over subfloor.

F. Wood "I" Beam Members:

1. Size and Shape as shown.

2. Cambered and marked "Top up".

3. Plywood webs: PS-1, minimum 3/8 inch thick, unless shown otherwise.

4. Flanges: Kiln dried stress rated dense lumber minimum 1-1/2 inch thick, width as shown.

5. Plywood web fitted into flanges and joined with ASTM D2559 adhesive to form "I" beam section unless shown otherwise.

G. Laminated Veneer Lumber (LVL):

1. Bonded jointed wood veneers with ASTM D2559 adhesive.
2. Scarf jointed wood veneers with grain of wood parallel.
3. Size as shown.

2.04 ROUGH HARDWARE AND ADHESIVES

A. Anchor Bolts:
   1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
   2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 1/2 inch bolt unless shown otherwise.

C. Washers
   1. ASTM F844.
   2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:
   1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
   2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:
   1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
   2. ASTM F1667:
      a. Common: Type I, Style 10.
      b. Concrete: Type I, Style 11.
      c. Barbed: Type I, Style 26.
      d. Underlayment: Type I, Style 25.
      e. Masonry: Type I, Style 27.
      f. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 1-1/4 inches long, 8d and deformed or annular ring shank.

F. Framing and Timber Connectors:
   1. Fabricate of ASTM A446, Grade A; steel sheet not less than 0.052 inch thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.
   2. Framing Angles: Angle designed with bendable legs to provide three way anchors.
   3. Straps:
      a. Designed to provide wind and seismic ties with sizes as shown or specified.
      b. Strap ties not less than 1-1/4 inches wide.
      c. Punched for fastener.

4. Metal Bridging:
    a. Optional to wood bridging.
    b. V shape deformed strap with not less than 2 nail holes at ends, designed to nail to top and side of framing member and bottom and side of opposite member.
    c. Not less than 3/4 by 5 inches bendable nailing flange on ends.
    d. Fabricated of 0.04 inch minimum thick sheet.
5. Joist Hangers:
    a. Fabricated of 0.063 inch minimum thick sheet, U design unless shown otherwise.
    b. Heavy duty hangers fabricated of minimum 0.108 inch thick sheet, U design with bent top flange to lap over beam.
6. Timber Connectors: Fabricated of steel to shapes shown.
7. Joist Ties: Mild steel flats, 3/16 by 1-1/4 inch size with ends bent about 30 degrees from horizontal, and extending at least 16 inches onto framing. Punch each end for three spikes.
8. Wall Anchors for Joists and Rafters:
    a. Mild steel strap, 3/16 by 1-1/4 inch with wall ends bent 2 inches, or provide 3/8 by 5 inch pin through strap end built into masonry.
    b. Strap long enough to extend onto three joists or rafters, and punched for spiking at each bearing.
    c. Strap not less than 4 inches embedded end.
9. Joint Plates:
    a. Steel plate punched for nails.
    b. Steel plates formed with teeth or prongs for mechanically clamping plates to wood.
    c. Size for axial eccentricity, and fastener loads.

G. Adhesives:
1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
2. For structural laminated Wood: ASTM D2559.

PART 3 – EXECUTION

3.01 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS

A. General:
1. Set rough carpentry to required levels and lines with members plumb, true to line, cut, and fitted.
2. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit.
3. Locate furring, nailers, blocking, grounds and similar supports to comply with requirements for attaching other construction.

B. Conform to applicable requirements of the following:
1. AFPA National Design Specification for Wood Construction for timber connectors.
2. AITC Timber Construction Manual for heavy timber construction.

3. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.
4. APA for installation of plywood or structural use panels.
5. ASTM F 499 for wood underlayment.
6. TPI for metal plate connected wood trusses.

C. Apply field treatment complying with AWPA to cut surfaces of preservative-treated lumber and plywood.

3.02 FASTENERS

A. Nails.

1. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
    a. For sheathing and subflooring, select length of nails sufficient to extend 1 inch into supports.
    b. Use eight penny or larger nails for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber.
    c. Use 16 penny or larger nails for nailing through 2 inch thick lumber.

B. Bolts:

1. Fit bolt heads and nuts bearing on wood with washers.
2. Countersink bolt heads flush with the surface of nailers.
3. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
4. Use toggle bolts to hollow masonry or sheet metal.
5. Use bolts to steel over 0.112 inch, 11 gage in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 24 inch intervals between end bolts. Use clips to beam flanges.

C. Drill Screws to steel less than 0.112 inch thick.

1. ASTM C1002 for steel less than 0.033 inch thick.
2. ASTM C 954 for steel over 0.033 inch thick.

D. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.

E. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.

F. Screws to Join Wood:

1. Where shown or option to nails.
2. ASTM C1002, sized to provide not less than 1 inch penetration into anchorage member.
3. Spaced same as nails.

3.03 INSTALLATION PROCEDURES

A. Installation of Timber Connectors:

1. Conform to applicable requirements of the NFPA National Design Specification for Wood Construction.
2. Fit wood to connectors and drill holes for fasteners so wood is not split.

B. Set sills or plates level in full bed of mortar on masonry or concrete walls.
1. Space anchor bolts 4 feet on centers between ends and within 6 inches of end. Stagger bolts from side to side on plates over 7 inches in width.
2. Use shims of slate, tile or similar approved material to level wood members resting on concrete or masonry. Do not use wood shims or wedges.
3. Closely fit, and set to required lines.

C. Cut notch, or bore in accordance with NFPA Manual for House-Framing for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

D. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking or Plates:
a. Stagger end joints between upper and lower pieces.
b. Nail at ends and not over 24 inches between ends.
c. Stagger nails from side to side of wood member over 5 inches in width.

E. Floor and Ceiling Framing:
1. Set with crown edge up.
2. Bear on not less than 4 inches on concrete and masonry, and 1-1/2 inches on wood and metal unless shown otherwise.
3. Support joist, trimmer joists, headers, and beams framing into carrying members at same relative levels on joist hangers unless shown otherwise.
4. Lap and spike wood joists together at bearing, or butt end-to-end with scab ties at joint and spike to plates. Scab tie lengths not less than 8 inches lap on joist ends. Install wood I beam joists as shown.
5. Frame openings with headers and trimmer joist. Double headers carrying more than two tail joists and trimmer joists supporting headers carrying more than one tail joist unless otherwise shown.
6. Drive nails through headers into joists using two nails for 2 inch by 6 inch; three nails for 2 inch by 8 inch and four nails for 2 inch by 10 inch and over in size.
7. Install nearest joist to double headers and spike joist to both header members before trimmer joist is installed and secured together.
8. Doubled joists under partitions parallel with floor joists.
9. Where joists run perpendicular to masonry or concrete, anchor every third joist to masonry or concrete with one metal wall anchor. Securely spike anchors with three nails to side of joist near its bottom.

10. Anchor joists running parallel with masonry or concrete walls to walls with steel flats spaced not over 6 feet apart. Extend steel flats over at least three joists and into masonry 4 inches with ends turned 2 inches; bolt to concrete. Set top of flats flush with top of joists, and securely nail steel flats to each joist.
11. Hook ties at steel framing over top flange of steel members.
12. Nonbearing partitions running parallel with ceiling joists, install solid 2 inch thick bridging same depth as ceiling joists cut to fit snug between joists for securing top plate of partitions. Securely spike bridging to joists. Space 4 feet on center.
13. Where ceramic tile finish floors are set in Portland cement mortar, nail continuous 2 inches by 3 inches ledgers to sides of joists to support subflooring flush with top of joist.

F. Bridging:

1. Use 1 inch by 3 inch lumber with ends beveled for slope. Option: Metal bridging may be used for wood bridging.
2. Install one row of bridging for joist spans over 8 feet, but less than 16 feet long; install two rows for spans over 16 feet long.
3. Install an extra row of bridging between trimmer and next two joists if header is more than 2 feet from end of trimmer or from regular row of bridging.
4. Secure with two nails at ends.
5. Leave bottom ends loose until after subflooring or roof sheathing is installed.
6. Install single row of bridging at centerline of span and two rows at the third points of span unless otherwise shown.

G. Roof Framing:

1. Set rafters with crown edge up.
2. Form a true plane at tops of rafters.
3. Valley, Ridge, and Hip Members:
   a. Size for depth of cut on rafters.
   b. Straight and true intersections of roof planes.
   c. Secure hip and valley rafters to wall plates by using framing connectors.
   d. Double valley rafters longer than the available lumber, with pieces lapped not less than 4 feet and spiked together.
   e. Butt joint and scab hip rafters longer than the available lumber.
4. Spike to wall plate and to ceiling joists except when secured with framing connectors.
5. Frame openings in roof with headers and trimmer rafters. Double headers carrying more than one rafter unless shown otherwise.
6. Install 2 inch by 4 inch strut between roof rafters and ceiling joists at 4 feet on center unless shown otherwise.

H. Partition and Wall Framing:

1. Use 2 inch by 4 inch studs spaced 16 inches on centers; unless shown otherwise.
2. Install double studs at openings and triple studs at corners.
3. Installation of sole plate:

a. Anchor plates of walls or partitions resting on concrete floors in place with expansion bolts, one near ends of piece and at intermediate intervals of not more than 4 feet or with power actuated drive pins with threaded ends of suitable type and size, spaced 2 feet on center unless shown otherwise.

b. Nail plates to wood framing through subfloor as specified in nailing schedule.

4. Headers or Lintels:

a. Make headers for openings of two pieces of 2 inch thick lumber of size shown with plywood filler to finish flush with face of studs or solid lumber of equivalent size.

b. Support ends of headers on top of stud cut for height of opening. Spike cut stud to adjacent stud. Spike adjacent stud to header.

5. Use double top plates, with members lapped at least 2-feet spiked together.

6. Install intermediate cut studs over headers and under sills to maintain uniformity of stud spacing.

7. Use single sill plates at bottom of opening unless shown otherwise. Toe nail to end stud, face nail to intermediate studs.

8. Install 2 inch blocking for firestopping so that maximum dimension of any concealed space is not over 8 feet in accordance with NFPA Manual for House Framing.

9. Install corner bracing when plywood or structured use panel sheathing is not used.

a. Let corner bracing into exterior surfaces of studs at an angle of approximately 45 degrees, extended completely over walls plates, and secured at bearing with two nails.

b. Use 1 inch by 4 inch corner bracing.

I. Rough Bucks:

1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.

2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.

3. Cut rough bucks from 2 inch thick stock, of same width as partitions in which they occur and of width shown in exterior walls.

4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.

J. Subflooring:

1. Subflooring may be either boards, structural-use panels, or plywood.

2. Lay board subflooring diagonally, with close joints. Stagger end joints and make joints over supports. Bear each board on at least three supports.

3. Provide a clearance of approximately 1/2 inch at masonry or concrete at walls.

4. Apply plywood and structural-use panel subflooring with face grain or long dimension at right angles to the supports, with edges 1/4 inch apart at side joints, and 1/8 inch apart at end joints.

5. Combination subfloor-underlayment:

a. A clearance of 1/4 inch at masonry on concrete at walls.

b. Stagger panel end joints and make over support.

K. Underlayment:

1. Where finish flooring of different thickness is used in adjoining areas, use underlayment of thickness required to bring finish flooring surfaces into same plane.
2. Apply to dry, level, securely nailed, clean, wood subfloor without any projections.
3. Fasten to subfloor as specified in ASTM F499.
4. Plywood and particle underlayment may be glue-nailed to subfloor.
5. Butt underlayment panels to a light contact with a 1/32 inch space between plywood or hardboard underlayment panels and walls, and approximately 3/8 inch between particleboard underlayment panels and walls.
6. Stagger underlayment panel end joints with respect to each other and offset joints with respect to joints in the subfloor at least 2 inches.
7. After installation, avoid traffic on underlayment and damage to its finish surface.

L. Sheathing:

1. Use plywood or structural-use panels for sheathing.
2. Lay panels with joints staggered, with edge and ends 1/8 inch apart and nailed over bearings as specified.
3. Set nails not less than 3/8 inch from edges.
4. Install 2 inch by 4 inch blocking spiked between joists, rafters and studs to support edge or end joints of panels.
5. Match and align sheathing which is an extension of work in place to existing.

END OF SECTION 061000

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SECTION 061040 – WOOD BLOCKING AND CURBING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Blocking at wall and roof openings.

B. Wood furring and grounds.

C. Concealed wood blocking for support of wall cabinets, millwork, doors, window frames and other items.

D. Telephone and electrical panel boards.

1.02 REFERENCES

A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

B. APA: American Plywood Association.

C. AWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.

D. AWPA (American Wood Preservers Association) C20 - Structural Lumber Fire Retardant Treatment by Pressure Process.

E. NFPA: National Forest Products Association.

F. SPIB: Southern Pine Inspection Bureau.

G. WCLIB: West Coast Lumber Inspection Bureau.

H. WWPA: Western Wood Products Association.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with the following agencies:

1. Lumber Grading Agency: Certified by ALSC.

2. Plywood Grading Agency: Certified by APA.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Lumber Grading Rules: NFPA, SPIB, WCLIB, WWPA

B. Miscellaneous Framing: Yellow pine species, 19 percent maximum moisture content, pressure preservative treat.

C. Plywood: APA Rated Sheathing; Exposure Durability 1; unsanded.

2.02 ACCESSORIES

A. Fasteners and Anchors:

1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.03 FACTORY WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using water borne preservative with 0.25 percent retainage.

B. Wood Preservative (Surface Application): Clear, type, manufactured by Thompsons Waterseal.

PART 3 – EXECUTION

3.01 FRAMING

A. Set members level and plumb, in correct position.

B. Place horizontal member flat, crown side up.

C. Space framing and furring 16 inches (400 mm) o.c.

3.02 SHEATHING

A. Install telephone and electrical panel boards with plywood sheathing material where required. Over size the panel by 12 inches (300 mm) on all sides.

3.03 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

END OF SECTION 061040

SECTION 062000 – FINISH CARPENTRY

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all labor, materials and equipment necessary to install finish carpentry required to satisfy the intent of the Contract Documents. This work shall include, but is not necessarily limited to, the following:

1. Door Casings
2. Window Frames
3. Trim

1.02 INDUSTRY STANDARDS

A. Publications of the following institutions, associations, societies and agencies are referred to in this section.

1. Architectural Woodwork Institute, "Quality Standards Illustrated", AWI-QSI
2. National Electric Manufacturers Association, NEMA.
3. National Forest Products Association, NFPA.

1.03 QUALITY ASSURANCE

A. Except as otherwise specified, the QUALITY STANDARDS of the Architectural Woodwork Institute, AWI-QSI, shall apply and by reference are hereby made a part of this specification. Any reference to Premium, Custom or Economy in this specification shall be as defined in the latest edition of the AWI-QSI.

1.04 SUBMITTALS

A. Submit samples of all exposed lumber and plywood which is to receive transparent finish.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Immediately upon delivery to job site, place materials in are protected from weather.

B. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation

C. Do not store or install seasoned materials in wet or damp portions of building.

PART 2 – PRODUCTS

2.01 MATERIALS – INTERIOR

A. Exposed lumber: Premium grade to match existing in accordance with AWI-QSI.

B. Concealed lumber: Economy grade softwood in accordance with AWI-QSI.

C. Finish per Section 099123, Painting and Finishing.

2.02 FABRICATION

A. Fabrication of all finish carpentry items using premium grade materials shall be premium grade and items using custom grade materials shall be custom grade in accordance with AWI-QSI.

B. All exposed wood and plywood items shall be sanded and ready to be finished in the field.

C. All corners at trim and base shall be mitered.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation shall be by trained and thoroughly experienced mechanics.

1. Work shall be set level and plumb. All joints where possible, shall be factory made. Where sections are too large to permit factory-made and factory-glued joints, same shall be cleated and bolted from behind, or held with patented metal fasteners. All joints shall be neat, clean and permanently held.

2. Fastenings shall be concealed wherever possible. Where nails are necessary, they shall be as small as practicable and countersunk for puttying. Nailing shall be in accordance with the nailing recommendations in NFPA "Manual for House Framing".

END OF SECTION 062000

SECTION 06 80 00 – FIBER REINFORCED POLYMER (FRP) LADDERS AND CAGES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.02 SUMMARY

A. This section includes FRP Products & Fabrications for FRP Ladders and Cages.

1.03 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals governed by this section necessary to install the fiberglass reinforced polymer (FRP) products as specified herein.

1.04 QUALITY ASSURANCE

A. The material covered by these specifications shall be furnished by an ISO-9001 certified manufacturer of proven ability who is regularly engaged in the manufacture, fabrication and installation of FRP systems.

B. Substitution of any component or modification of system shall be made only when approved by the Architect or Design Engineer.

C. Manufacturer Qualifications: A company with a minimum of 10-years of experience in successfully producing FRP shapes required for this project, with sufficient production capacity to produce required units without causing delay in the work.

D. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.05 DESIGN CRITERIA

A. The design of FRP ladder, cage systems and fall protection systems, including connections, shall meet the requirements set forth in OSHA 1910.23, 1910.28, 1910.29 and 1926.1053, local building codes and industry standards as applicable.

B. The minimum design live load shall be a single concentrated load of 200 pounds. Additional concentrated live load units of 200 pounds each as determined from anticipated usage of the ladder shall be located at such points as will cause the maximum stress in the member being considered.

C. Temperature exposure is limited to 100°F unless specifically stated otherwise in drawings and/or supplementary conditions.

1.06 SUBMITTALS

A. Shop drawings of ladders and cages shall be submitted to the Design Engineer for approval in accordance with the requirements of Division 1. Fabrication shall not start until receipt of Design Engineer's approval marked "Approved As Submitted" or "Approved As Noted".

B. Manufacturer's catalog data showing:

1. Materials of construction
2. Dimensions, spacings, and construction per the manufacturer's Worksheet.

C. Detail shop drawings showing:

1. Dimensions

2. Sectional assembly
3. Location and identification mark
4. Size and type of supporting frames required

D. Samples of each type of product shall be submitted for approval in accordance with the requirements of Section 01 33 00.

1.07 SHIPPING AND STORAGE INSTRUCTIONS

A. All systems, sub-systems and structures shall be shop fabricated and assembled into the largest practical size suitable for transporting.

B. All materials and equipment necessary for the fabrication and installation of pultruded ladders and cages shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Design Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work and replaced with undamaged material. The Contractor shall receive no compensation for the damaged material or its removal and replacement.

C. Identify and match-mark all materials, items and fabrications for installation and field assembly.

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials used in the manufacture of the FRP ladders and cages shall be raw materials in conformance with the specification and certified as meeting the manufacturer's approved list of raw materials.

B. All raw materials shall be as specified by the contract.

C. The visual quality of the pultruded shapes shall conform to ASTM D4385.

D. With the exception of ladder hoops and NSF ladders, FRP ladders and cages shall be manufactured using a pultruded process utilizing vinyl ester resin with flame retardant and ultraviolet (UV) inhibitor additives. A synthetic surface veil fabric shall encase the glass reinforcement. FRP shapes shall achieve a flame spread rating of 25 or less in accordance with ASTM test method E-84, the flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.

For ladders and cages submerged in potable water, a polyester resin shall be utilized that meets ANSI/NSF standard 61, or approved painting system that meets NSI/NSF standard 61, either certified for potable water applications as required. A synthetic surface veil shall be the outermost layer covering the exterior surface.

E. After fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating.

F. FRP products exposed to weather shall contain an ultraviolet inhibitor. Should additional ultraviolet protection be required, a one mil minimum UV coating can be applied.

G. All exposed surfaces of pultruded materials shall be smooth and true to form, consistent with ASTM D4385.

H. Manufacturers:

1. Strongwell: For quotes contact Dan Smith, CCT-Sales Director,

Cell phone: 517-420-1913

2. Or Engineer Approved Manufacturer

I. Pultruded FRP products shall be manufactured and fabricated in the USA. Manufacturer shall provide a written Certificate of Compliance.

2.02 FRP LADDERS AND CAGES

A. Performance Requirements

1. Ladder, cage systems and fall protection systems shall meet the requirements set forth in OSHA 1910.23, 1910.28, 1910.29 and 1926.1053, local building codes and industry standards as applicable.

B. Materials

1. The side rails and cage straps shall be fiberglass reinforced pultruded polyester with OSHA safety yellow pigment. As an option, an industrial grade polyurethane yellow coating may be applied to the finished ladder and cage. Other colors are available as an option.

2. The side rails shall be 2” or 2.375” square tube with a wall thickness of 0.156” or greater. The rungs shall be pultruded 1.25” diameter FRP fluted tube.

3. Cage hoops shall be manufactured by the open mold hand lay-up process with a width of 3” and thickness of 1/4” minimum at the top and bottom and 2” x 1/4” at the intermediate hoops. The cage shall be interconnected with 2” x 3/16” pultruded straps spaced 9” on center around the hoop.

4. Fiberglass pultruded rails, cage straps, fluted tube and cage hoops to be manufactured by Strongwell or engineer approved equivalent.

C. Fabrication Requirements

1. All joints and rungs shall be riveted. The hoops shall be attached to the rails in a manner which provides hand clearance throughout the length of the ladder.

2. Ladders shall be shop assembled, and as an option may be pre-drilled and prepared for field attachments of standoff clips.

3. The ladder cages shall be shipped assembled using rivets or bolts.

D. Workmanship

1. All cut or machined edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used in the structural shape.

E. Approved Fabricators

1. Strongwell, or a Strongwell-trained fabricator

2. Or engineer approved fabricator

F. Installation

1. All FRP ladder sections shall be installed as shown on the approved shop drawings.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.

B. Coordinate delivery of such items to project site.

3.02 INSPECTION AND TESTING

A. The Design Engineer shall have the right to inspect and test all materials to be furnished under

these specifications prior to their shipment from the point of manufacture.

B. All labor, power, materials, equipment and appurtenances required for testing shall be furnished by the Contractor at no cost to the Owner.

3.03 INSTALLATION, GENERAL

A. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as determined by the Design Engineer.

B. Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; measured from established lines and levels.

C. Provide temporary bracing or anchors in form work for items that are to be built into concrete masonry or similar construction.

3.04 ALL FRP INSTALLATION

A. All field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.

B. Install items specified as indicated and in accordance with manufacturer’s instructions.

END OF SECTION

SECTION 06 82 10 – FIBERGLASS REINFORCED GRATING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Fiberglass grating, supporting angles and appurtenances.

B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:

1. Section 03 60 00, Grouting.
2. Section 05 05 33, Anchor Systems.
3. Section 05 50 13 – Miscellaneous Metal Fabrications
4. Section 06 80 00, Fiber Reinforced Polymer (FRP) Ladders and Cages.

1.02 REFERENCES

A. Codes and standards referred to in this Section are:

1. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
2. ASTM D 256 - Impact Resistance of Plastics and Electrical Insulating Materials
3. ASTM D 638 - Test Method for Tensile Properties of Plastics
4. ASTM D 695 - Test Method for Compressive Properties of Rigid Plastics
5. ASTM D 790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
6. ASTM D 792 - Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement
7. ASTM D 2583 - Test Method for Indentation Hardness of Rigid Plastic by Means of a Barcol Impressor
8. ASTM D 2584 - Test Method for Ignition Loss of Curved Reinforced Resins
9. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials

1.03 SYSTEM DESCRIPTION

A. Design Requirements: Design grating for the uniform live load indicated on drawings or concentrated load of 300 pounds at midspan, with the deflection not exceeding 1/360 of the span.

B. Performance Requirements: Meet or exceed the following requirements:

		Strength	
Property	Test Method	Pultruded	Molded
Tensile Strength	ASTM D638	100,000 psi	25,000 psi
Flexural Strength	ASTM D790	100,000 psi	35,000 psi
Flexural Modulus	ASTM D790	5,500,000 psi	1,500,000 psi
Compressive Strength	ASTM D695	58,000 psi	20,000 psi
Izod Impact-Notched	ASTM D256	25 FT-lb/in.	8 FT-1b/in.
Barcol Hardness	ASTM D2583	50	35
Coefficient of Thermal Expansion	ASTM C177	$4x10^{-6}$in/in/F	$7x10^{-6}$in/in/F
Specific Gravity	ASTM D792	1.85	1.50
Glass Content		70%	35%

Meet ASTM E84 Class 1 flame spread 0-25.

1.04 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 1.

B. Submit completely detailed working drawings of all grating and plate for approval before any fabrication is started.

C. Literature: Submit manufacturer's literature including load, span and deflection tables for floor grating and plate, and field installation instructions.

D. Samples: Submit 12-inch by 12-inch samples of each type of floor grating and plate to be used.

E. Laboratory Certification: Submit reports of compliance with performance requirements. Pull one random sample from each product batch for testing.

1.05 QUALITY ASSURANCE

A. Design Professional: Engage a professional structural engineer experienced in design of floor grating and licensed in the State of Indiana, to perform design and seal grating design.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle all products and materials as specified in Division 1 and as follows:

1. Dumping or dropping from trucks is not permitted. Return all damaged sections and supply a new piece at no additional expense to the Owner.

2. Store materials in areas set aside for such use. Store on skids or platforms above ground. Do not permit warping, bending or loads exceeding design capacity.

1.07 WARRANTY

A. Provide warranty as specified in Division 1.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

1. Fibergrate
2. Bedford

2.02 MATERIALS

A. General:

1. Provide molded type grating sections which are readily removal and replaceable.
2. Use premium grade, chemical resistant, vinyl ester resin, meeting the requirements of ASTM E 84 Class I.
3. Form molded grating from bars in a square mesh pattern at least 1-1/2 inches deep on 1-1/2-inch centers.
4. Provide holes where required for the passage of pipes, gate stems, or for other purposes. Reinforce holes to preserve strength. Band openings and ends of all grating to the full depth of the grating with fiberglass strips bonded to all intersecting members.
5. Provide ultraviolet resistance designed for outdoor application.
6. Provide skid-resistant surface.
7. Provide grating of uniform and constant profile.
8. Provide grating free of warps, twists or other defects which affect appearance or serviceability.
9. Provide grating in safety yellow color.

B. Supporting Angles: FRP grating to bear on aluminum beams and/or aluminum edge angles imbedded in concrete walls unless otherwise indicated.

C. Appurtenances: Provide and install hold down clips of Type 316 stainless steel as shown. Use clips that do not protrude above the top plane of the grating.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Erect grating in place on supporting members, as shown, with full and uniform bearing on the supports, precluding rocking movement. Do not use wedges or similar shimming devices. Lock individual grating panels securely in place with approved clamps or devices. Paint surfaces of aluminum supporting members and anchors which will be in contact with concrete as specified in Section 09 96 00.

B. Positioning: Install grating sections for ease of removal and replacement. Permit a maximum clearance of 1/4-inch at ends and between sections. Neatly fit adjacent sections so that transverse members form an uninterrupted straight line.

C. Fasteners: Fasten each grating section to the support members with approved fasteners. Do not permit fasteners to extend above the top plane of the grating.

D. Penetrations: Provide penetrations where required for the passage of pipes, gate stems, or for other purposes. Reinforce grating where necessary to preserve its strength. Band openings in, and ends of all grating to the full depth of the grating with fiberglass strips bonded to all intersecting members.

E. Cut Ends: Seal all field-cut surfaces in accordance with the grating manufacturer's recommendations or instructions.

END OF SECTION

SECTION 070150 - PREPARATION FOR RE-ROOFING

PART ONE – GENERAL

1.01 SCOPE OF WORK

A. Remove existing roofing gravel, base flashings, sheet metal, vent stack flashings, existing roofing system, and rigid insulation down to the deck. Sweep or clean all debris off of the deck.

1.02 PRE-INSTALLATION CONFERENCE

A. Review installation procedures and coordination required with related work.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Do not remove existing roofing system or damaged decking when weather conditions threaten the integrity of the building contents or intended continued occupancy. Maintain continued temporary protection prior to installation of the new roofing system.

1.04 PROTECTION

A. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction. A four (4) hour time limit shall be given from the time of notification of emergency conditions. In the event of water penetration during rain or a storm, the Contractor shall provide for repair or protection of the building contents and interior. If the Contractor does not respond or cannot be contacted, the Owner will affect repairs or emergency action and the Contractor shall be back charged for all expenses and damages, if any.

1.05 SCHEDULING

A. Schedule work to coincide with commencement of installation of new roofing system.

PART TWO – PRODUCTS

2.01 MATERIALS

A. Temporary protection: Sheet Polyethylene. Provide weights or fasteners to retain sheeting in position.

B. Base Sheet: ASTM D-4601 Type II. Provide weights or fasteners to retain sheeting in position.

PART THREE – EXECUTION

3.01 EXAMINATION

A. The Roofing Contractor is to verify existing site conditions, including roof dimensions.

B. The Roofing Contractor must verify that the existing roof surface is clear and ready for work of the section.

3.02 MATERIALS REMOVAL

A. Remove all gravel, membrane, cant strips, rigid insulation, expansion joints, base flashings, and any other items shown on the drawings. In addition, complete removal of all nails and other debris is required to leave a smooth, even surface for re-roofing.

B. Under certain conditions, it will be necessary and desirable to incorporate one or more of the following methods for removal of dirt, silt, gravel, debris, roof membrane and insulation from the roof surface in order to preserve the ecology, eliminate unsightly conditions, and protect the building surfaces:

1. Roof vacuum systems.
2. Crane and hopper with dump truck system.
3. Enclosed chutes with protective shrouds on the building and ground surfaces.

C. All debris dumped from the roof shall be transported from the roof via chutes into dumpsters or trucks and this debris shall be removed from the premises when vehicles are full at the Contractor's cost. No debris shall be transported from the area being worked on over a previously finished roof without an underlayment of 3/4" plywood.

D. All roof equipment not in use or left filled will be parked on the column lines on ¾" plywood.

E. Building and/or ground damage caused by the removal or installation of the roof system will be the sole responsibility of the Contractor.

3.03 TEMPORARY PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected deck surface.

END OF SECTION 070150

SECTION 072116 – BATT INSULATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all materials, labor, and equipment necessary to install fibrous insulation as required by the intent of the Contract Documents.

1.02 PRODUCT DELIVERY AND STORAGE

A. Containers shall be factory marked to identify material, type, grade, and manufacturer.

B. Protect the materials of this Section from exposure to the elements. Do not store on the ground.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fibrous Insulation
   1. Material: Fiberglass
   2. Type: Batt or rolls - foil or reinforced paper faced vapor barrier on all exterior planes.
   3. Thickness: Shall be equal to the nominal thickness of the cavity in which it is placed, unless noted otherwise in the Contract Documents
   4. Standards: Federal Specification HH-I-521F & ASTM C665.

B. Fibrous Insulation
   1. Material: Mineral Fiber
   2. Type: Batt-creased, unfaced, 3.0 pcf
   3. Thickness: 3" minimum, and as required to achieve indicated R-value.

C. Standards:
   1. Thermafiber SAFB by USG Acoustical Products Company and Pyro-Fiber Sound Control Blanket by Johns Manville Company

PART 3 – EXECUTION

3.01 INSPECTION

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. In the event of a discrepancy, immediately notify the Architect. Do not proceed with the installation until all discrepancies have been resolved.

3.02 INSTALLATION

A. Install insulation in continuous unbroken plane as indicated on the drawings.

B. Lap and seal all joints between batts or rolls and at ends of rolls or batts.

C. Stuff all holes, cracks or recesses with insulation.

D. Fit insulation tightly around all penetrations (pipes, conduits, joists, etc.) of the insulation plane.

E. For vertical installation, staple, glue, or wire insulation in place.

F. Except as otherwise specifically directed by the Architect, install all insulation in accordance with the manufacturer's recommendations.

G. Kraft faced vapor barriers shall not be installed within any wall of fire-rated construction.

END OF SECTION 072116

SECTION 075324 - FULLY ADHERED ETHYLENE PROPYLENE DIENE TERPOLYMER (EPDM) MEMBRANE

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Fully Adhered Ethylene Propylene Diene Terpolymer (EPDM) Membrane Roofing.

B. Membrane flashing and counterflashing.

1.02 QUALITY ASSURANCE

A. Applicator: Company specializing in installation of sheet roof membranes with five years documented experience and approved by membrane manufacturer.

B. Membrane manufacturer's representative shall inspect project both during the roof installation and after its completion.

1.03 SUBMITTALS

A. Submit under provisions of the General Conditions.

B. Shop drawings showing roof size, location and type of penetrations, perimeter and penetration details, and special joint conditions.

C. Submit product data for sheet membrane, flashing, joint cover sheet, and joint sealants, with temperature range for application of membrane.

D. Submit manufacturer's warranty after completion of installation.

E. Submit manufacturer's installation instructions and recommendations.

1.04 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference one week prior to beginning of the Work of this Section.

B. Require attendance of parties directly affecting work of this Section.

C. Review conditions of installation, installation procedures, and coordination required with related work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle, and protect under provisions of Division 01.

B. Deliver material in manufacturer's original unopened containers with labels intact and legible.

C. Store materials in weather protected environment clear of ground and moisture.

D. Protect membrane and installed areas from damage when transporting materials. Place 3/4" plywood sheets in traffic path.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply membrane during inclement weather or when air temperature is below 40 degrees F.

1.07 WARRANTY

A. Provide Twenty (20) Year Manufacturer's Total System Warranty under provisions of Division 01.

B. Include coverage of materials and installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE ROOFING SYSTEMS

A. Carlisle Tire and Rubber Company - Sure-Seal™ Adhered Roofing System

B. Genflex Roofing Systems - Genflex EPDM

C. Firestone Building Products - RubberGuard EPDM Membrane

D. Approved equal Manufacturer meeting the Technical Requirements of this Section

2.02 MEMBRANE MATERIALS

A. Membrane: 0.060 mil thick black EPDM

B. Lap Sealant Materials: As recommended by membrane manufacturer.

2.03 ACCESSORIES

A. Bonding Adhesive: As provided by the membrane manufacturer.

B. Sealants: As recommended by the membrane manufacturer.

C. Wood Blocking: Shall be #2 or better, S4S, Douglas Fir-Larch, CCA pressure treated.

PART 3 - EXECUTION

3.01 INSPECTION

A. Beginning of installation shall mean acceptance of substrate.

3.02 BLOCKING NAILER INSTALLATION

A. Install wood nailers (if required) at roof perimeters, at base of roof projections, and around specified roof penetrations. Total nailer height shall match total thickness of insulation being used.

3.03 MEMBRANE INSTALLATION

A. Install membrane roofing in strict accordance with membrane manufacturer's instructions and recommendations.

3.04 CLEANING

A. Remove trash and debris resulting from roofing work at the end of each day.

3.05 PROTECTION

A. Protect finished installation under provisions of Division 1.

B. Protect building contents from weather damage during re-roofing operations.

C. After installation, close off area to prevent unauthorized traffic.

END OF SECTION 075324

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Coping, flashing.

1.02 REFERENCES

A. AISI (American Iron and Steel Institute) - Stainless Steel- Uses is Architecture.

B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate.

C. ASTM A525- Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.

D. ASTM B32- - Solder Metal.

E. ASTM B209- Aluminum and Alloy Sheet and Plate.

F. ASTM B370- Copper Sheet and Strip for Building Construction.

G. ASTM B486- Paste Solder.

H. ASTM D226- Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

I. ASTM D4586- Asphalt Roof Cement, Asbestos-Free.

J. CDA (Copper Development Association) - Contemporary copper, A Handbook of Sheet coper Fundamentals, Design, Details and Specifications.

K. CDA- Copper Roofing- A Practical Handbook.

L. FS O-F-506- Flux, Soldering, Paste and Liquid.

M. NRCA (National Roofing Contractors Association) - Roofing Manual.

N. SMACNA- Architectural Sheet Metal Manual.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Submit two samples 4 x 6 inch (100 x 150 mm) in size illustrating metal finish color.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with (AISI) (CDA) (SMACNA) (NRCA) standard details and requirements.

B. Maintain one copy of each document on site.

1.05 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal flashing work with three years documented experience.

1.06 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this section, under provisions of Section 013100.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 016000.

B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Copings

1. Hickman "Permasnap Coping"
2. MM Systems "SnapLock Coping I"
3. Metal – ERA

2.02 SHEET MATERIALS

A. Aluminum Sheet: ASTM B209; 26 gauge thick; shop pre-coated with Kynar coating of standard color.

2.03 ACCESSORIES

A. Fasteners: Aluminum with soft neoprene washers.

B. Underlayment: ASTM D226, No.

C. Slip Sheet: Rosin sized building paper.

D. Protective Backing Paint: Bituminous.

E. Sealant: Silicone type as specified in Section 079200.

F. Bedding Compound: Butyl type.

G. Plastic Cement: ASTM D4586, Type I.

2.04 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 2 inches wide, interlockable with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

E. Form material with flat lock seams.

2.05 FINISH

A. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.03 INSTALLATION

A. Conform to drawing details included in the SMACNA manual.

B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place. Make corners square, surfaces true straight in planes, and lines accurate to profiles.

E. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 014000.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 076200

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SECTION 079200 – SEALANTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included:

1. The purpose of sealant in this work is to provide a positive barrier against penetration of moisture at joints between items where sealant is essential to the continued integrity of the barrier.
2. Such sealant may be performed under the work of various sections of these specifications, but must be performed in strict accordance with the provisions of this section.

B. Related Work Specified Elsewhere:

1. Section 092600 Acoustical Treatment for Partitions/Ceilings

1.02 PRODUCT HANDLING

A. Use all means necessary to protect sealant materials before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

C. Storage:

1. Store all sealant materials and equipment under conditions recommended by its manufacturer.
2. Do not use materials stored for a period of time exceeding the maximum recommended shelf-life of the material.

1.03 SUBMITTALS

A. Submit product literature to the Architect in accordance with Section 013200 of these specifications.

PART 2 – PRODUCTS

2.01 MATERIALS

A. All sealant materials, unless otherwise specifically approved by the Architect, shall be single or double component, non-sagging type in neutral color or other color as approved by the Architect where exposed to view.

B. Sealants:

1. Acrylic Latex: One-part, gun-grade, nearly 100 percent recover from 100 percent elongation, excellent paintability, service temperature range zero to +180 degrees fahrenheit (such as Sonneborn Sonolac).
2. Urethane: Two part, gun-grade, such as Sonneborn Sonolastic NP-2.
3. Silicone (exterior and interior): One part, gun-grade, such as Sonneborn Sonolastic Omniseal.
4. Silicone (interior at areas where moisture is present): One part, gun-grade, mildew and fungus resistant, such as Sonneborn Sololastic Omniplus.
5. Polyurethane: One part pourable, such as Sonneborn Sonolastic SL1.

6. Polysulfide: Two-part gun grade; ANSI A116.1 and Thiokol Building-Trade Performance Specification (such as Sonneborne Sonolastic Two-Part).

C. Primers: Quick-drying, clear, as recommended by the sealant manufacturer.

D. Backer Rods: Closed-cell polyethylene or urethane foam, polyvinyl chloride, or closed-cell neoprene; circular in cross section and of sizes to assure that they will stay in place under pressure of applying sealants.

2.02 EQUIPMENT

A. All sealant equipment shall be only such equipment as is specifically recommended by the manufacturer of the sealant material being installed.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspections:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that sealant may be installed in accordance with the manufacturer's recommendations.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

A. Primers: Where recommended or required by sealant manufacturer, prime joints with brushes that will reach all surfaces of joint. Mask adjacent surfaces that will not be covered with sealant and that are subject to staining or other damage by primers.

B. Backer Rods: Install firmly and evenly in place where indicated or required to depths and contours recommended by sealant manufacturer. Use backer rods for all exterior caulking work.

3.03 SEALANT LOCATIONS

A. Acrylic Latex: Interior work, where exposed to view; use at contacts of counter tops, backsplashes and endsplashes (where moisture is not present) and walls adjacent thereto; interior control joints and periphery joints at doors and windows. (Colors as selected by Architect).

B. Silicone: Interior work, where not exposed to view; for all acoustical caulking, where acoustical drywall abuts floors and ceilings and where penetrations occur in such walls, such as electrical boxes, fire extinguishers, cabinets, etc.

C. Silicone (exterior): One part, construction grade: metal flashings. (Color as selected by Architect).

D. Silicone (interior where moisture is present): At countertops, backsplashes and endsplashes and walls adjacent thereto, and around all plumbing fixtures.

E. Urethane, two-part, gun-grade: Exterior masonry and concrete work (except joints in horizontal concrete slabs); vertical control joints; color as selected by Architect.

F. Polyurethane, one-part pourable: Exterior concrete flatwork.

3.04 APPLICATION

A. Apply sealants with guns or other devices having nozzles of size to allow joints to be completely filled with single bead of material. Use sufficient pressure to drive materials completely and fully into joints so that joints are weathertight and watertight. Point joints at flush vertical surfaces slightly concaved; point joints at flush horizontal surfaces slightly convexed so that moisture will not "pond" thereon; uniformly smooth and straight, free from wrinkles and sags. Finished installations of acoustical caulking shall maintain indicated STC ratings.

3.05 APPLICATION LIST

A. Specific applications listed hereinafter are to be used as a bidding and application aid and are not intended to necessarily represent all required sealant applications.

1. Exterior and Interior control joints.
2. Periphery joints at exterior steel frames, exterior aluminum frames, interior steel frames, interior aluminum frames, windows, louvers and similar wall penetrations.
3. Plumbing fixture to wall joints.
4. Counter top and counter top backsplash to wall joints.
5. Exterior wall penetrations.
6. Cut stone to cut stone joints and stone to brick joints.
7. Perimeter stone to wall joints.
8. All applications indicated on drawings, other locations standard to the industry and as directed by the Owner.

3.06 COMPLETION OF WORK

A. Remove excess sealants from joints. Remove sealant deposits from surfaces not intended to be caulked and restore such surfaces to their original conditions.

END OF SECTION 079200

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SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, services, equipment and apparatus whether necessary or incidental to complete installation of all hollow metal doors and frames required for the project as shown on the Drawings and specified herein.

B. Non-rated steel doors

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 00 - Bidding and Contract Requirements, including the General Conditions of the Contract

B. Division 01 - General Requirements

C. Section 061000 - Rough Carpentry

D. Section 079200 - Joint Sealants

E. Section 081416 - Flush Wood Doors

F. Section 087100 - Finish Hardware

G. Section 088100 - Glass and Glazing

H. Section 092116 - Gypsum Wallboard Systems

I. Section 099123 - Painting and Finishing

1.03 SITE INSPECTION

A. This Contractor shall visit the site and become thoroughly familiar with all conditions. Refer to Division 1 for site examination requirements and procedures.

1.04 REFERENCE STANDARDS

A. ANSI/S.D.I. 100 - RECOMMENDED SPECIFICATIONS STANDARD STEEL DOORS AND FRAMES, Steel Door Institute.

B. ANSI A115 - STANDARD SPECIFICATION FOR DOOR AND FRAME PREPARATION FOR HARDWARE, American National Standards Institute.

C. Thermal rated assemblies ASTM C236-89 or ASTM C976-90

1.05 SUBMITTALS

A. Manufacturer's written certification that materials meet Specification requirements

B. Submit under provisions of Section 013200

C. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cutouts for glazing, and finish.

D. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.

E. Manufacturer’s installation instructions: indicate special installation instructions.

F. Manufacturer’s certificate: Certify that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Installer: Company specializing in hollow metal door and frame work of comparable scope with a minimum of three (3) years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.09 COORDINATION

A. Coordinate the work with door opening construction, door frame and door hardware installation.

PART 2 - PRODUCTS

2.01 MATERIALS - INTERIOR DOORS - GENERAL

A. Sheet Steel: Commercial quality carbon steel, cold-rolled, annealed, and free from scale, pitting, rust or other defects - ASTM A366

1. Gauges:

a. Interior frames - 18 gauge, mitered corners.

b. Interior doors - (Non-rated): SDI-100 Grade II, 18 gauge, heavy duty 1-3/4" (44mm) (Level B),Model 3 - Seamless .

c. Reinforcement for hardware - in accordance with Steel Door Institute Standard (S.D.I.) 100, Table IV.

d. Glass Moldings - 20 gauge.

B. Primer:

1. For non-galvanized steel, primer shall be manufacturer's standard rust-resistant metallic or phenol-resin primer.

2. For galvanized steel, primer shall be zinc dust oxide primer, such as Porter No. 299 Zinc-dust Primer.

3. Air dried.

C. Core Filler Material:

1. Non-insulated doors - manufacturer's standard cardboard honeycomb.

2. Core material shall completely fill the inside of the door and be laminated to both inside faces of the panels.

D. Acceptable manufacturers:

1. Steelcraft

2. Republic Doors and Frames

3. Ceco Door.

4. Curries

5. Mesker Door.

PART 3 – EXECUTION

3.01 FABRICATION

A. Frames shall be set up, arc welded and ground smooth and shall have spreaders attached. Provide frame anchors of the proper type for adjoining construction. No less than three (3) wall anchors per jamb or frames to 7'-4" high, four (4) anchors per jamb for frames over 7'-4" high.

B. Doors shall be full flush type, with seams finished so as to be invisible.

1. Close top and bottom edges of door with steel channel, minimum 18 gauge, extending full width of door, and spot welded to both faces.

2. Provide bevel on swing side.

3. Provide adequate bracing.

4. Fabricate doors with hardware reinforcement welded in place.

C. Provide for hardware specified in Section 087100 - Finish Hardware. Provide reinforcing for hardware in accordance with ANSI A115.

D. Provide UL labels of non-rusting metal attached with pop rivets on both doors and frames where indicated. Unless otherwise scheduled, "B label" shall be "1-1/2 hour B label".

E. Provide screw-on glazing stops with mitered corners. Locate stops on non-security side of opening.

F. Finishing:

1. Thoroughly clean all contaminates from surface by washing with clean solvent and wiping with clean cloths.

2. Treat non-galvanized items with phosphate pretreatment.

3. All doors and frames shall receive a factory applied primer.

4. All concealed parts of frames to be installed in masonry walls shall be coated with bituminous paint.

G. Furnish galvanized steel shims as required to maintain 1/8" clearance between frame and door and between pairs of doors.

H. Where indicated, provide inserted type sightproof stationary metal louvers.

I. For openings which are to be equipped with electric door locks, modify standard frame and door construction as is necessary to accommodate the electric locks.

J. Steel sheet: Galvanized to ASTM A525 G60.

3.02 INSTALLATION

A. Anchor work securely to adjacent construction.

B. Set frames accurately, plumb and square. Brace until attached to adjacent construction.

C. Install doors in accordance with ANSI/SDI-100 and DHI.

D. Do not use cardboard or other unspecified material for shims.

E. Install metal doors and frames in accordance with the following standards published by the Steel Door Institute: Frames, SDI 105; Hardware, SDI 107; Doors, SDI 100.

F. Frames installed in existing masonry walls shall be grouted in on both sides to provide a sealed installation. Grout used shall meet rating of the door and frame assembly.

G. Coordinate installation of doors with installation of frames and hardware specified in Section 087100.

3.03 DISPOSAL

A. All waste materials shall be properly and legally recycled or disposed of off the site by the Contractor. Burning on the site will not be allowed.

3.04 EXAMINATION

A. Verify substrate conditions.

B. Verify that opening sizes and tolerances are acceptable. ERECTION TOLERANCES

C. Maximum Diagonal Distortion: 1/16 inch (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust work under provisions of Section 017700.

B. Adjust door for smooth and balanced door movement.

END OF SECTION 081113

SECTION 081416 – FLUSH WOOD DOORS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Furnish and install solid core flush wood doors and pre-hung hollow core flush wood doors for this work where indicated and scheduled on the drawings.

B. Related Work Specified Elsewhere:

1. Section 087100 Finish Hardware
2. Section 088100 Glazing
3. Section 099123 Painting and Finishing

1.02 INDUSTRY STANDARDS

A. Flush wood doors shall comply with WDMA Industry Standards 1-A and Architectural Woodwork Institute for Type PC.

1.03 QUALITY ASSURANCE

A. Regulatory Agencies: Fabricate those flush wood doors indicated on the drawings to be fire-rated in accordance with applicable Underwriter's Laboratories, Inc. (UL) Specifications. Each required door shall bear the authorized UL label showing the rating index and its conformance to the applicable specification. Where provisions of this section conflict with an applicable UL specification, notify the Architect immediately and do not fabricate the doors in conflict until instructed to do so by the Architect.

1.04 SUBMITTALS

A. Shop Drawings: Submit to the Architect for approval showing fabrication techniques, details, elevations, dimensions and schedule of flush wood door sizes, locations and types.

B. Submit manufacturer's written lifetime guarantees.

1.05 PRODUCT HANDLING

A. Protection: Use all means necessary to protect flush wood doors before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, and at no additional cost to the Owner.

C. Storage: Store doors as recommended by the manufacturer, off the floors and in manners that will prevent undue deflections and in locations that will minimize chances of damage caused by construction operations. Never store doors outside the building or in damp interior spaces. Keep stockpiles covered, but do not restrict air circulation around the stockpiles.

PART 2 – PRODUCTS

2.01 SOLID CORE WOOD DOORS

A. Solid core door materials shall conform to AWS-current edition, Custom Grade and as follows:

1. Doors shall be solid glued block core or mat-formed wood particle board core type with edge bands glued to core.
2. Doors shall be faced with WDMA “A” grade, plain sliced, White Oak veneers.

3. Finish shall be AWS Finish System 9 or WDMA TR-6 or TR-8. Stain color as selected by architect from manufacturer's full range.
4. All door glazing to be stopped with wood beading. Fire-rated doors to utilize labeled beaded lite (20 minute rating) on Fire-Rated Veneered Lite Beading (45, 60, and 90 minute rating).

B. Standards:

1. Algoma Hardwoods
2. Masonite
3. VT Industries - Eggers
4. Marshfield Door Systems

PART 3 – EXECUTION

2.01 INSTALLATION

A. Surface conditions:

1. Prior to installation of flush wood doors, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where the installation may properly commence.
2. Verify that flush wood doors may be installed in accordance with the original design, the referenced standards, and all pertinent codes and regulations.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

B. Installation:

1. Hang flush wood doors squarely in the appropriate frames, maintaining clearances of 1/8 inch at tops and jambs and 3/8 inch from finished floors at bottoms, except where undercuts are indicated on the drawings, in which cases maintain such undercuts from finished floors.
2. Door shall operate freely and smoothly without binding or rubbing frames or floors, or both.
3. When adjustments are necessary, perform such adjustments only as approved by the Architect.
4. Anchor doors firmly into position for long life under hard use.
5. Mount door louvers in center of door 1'-0" from bottom of louver to finish floor.

END OF SECTION 081416

SECTION 084313 – ALUMINUM ENTRANCES AND STORE FRONTS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Aluminum doors, windows and frames.

B. Vision glass.

C. Door hardware.

D. Perimeter sealant.

1.02 REFERENCES

A. AA (Aluminum Association)- Designation System for Aluminum Finishes.

B. AAMA- Metal Curtain Wall, Window, Store Front and Entrance-Guide Specification Manual.

C. AAMA- Curtain Wall Manual #10 -Care and Handling of Architectural Aluminum From Shop to Site.

D. AAMA 501.2- Methods of Test For Metal Curtain Walls.

E. AAMA 603.8- Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

F. AAMA 605.2- Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

G. AAMA 606.1- Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.

H. AAMA 607.1- Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

I. AAMA 608.1- Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

J. AAMA FC-1 - Field check of metal curtain walls for water leakage.

K. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

L. ANSI A117.1 - Safety Standards for the Handicapped.

M. ASCE 788 - Calculation of Wind Loads.

N. ASTM A36/A36M - Structural Steel.

O. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

P. ASTM A446/A446M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

Q. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

R. ASTM B209M- Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

S. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

T. ASTM B221M- Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube (Metric).

U. ASTM E283- Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.

V. ASTM E330- Structural Performance of Exterior Windows, CurtainWalls, and Doors by Uniform Static Air Pressure Difference.

W. ASTM E331- Test Method for Water Penetration of Exterior Windows, CurtainWalls, and and Doors by Uniform Static Air Pressure Difference.

X. ASTM E1105- Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

Y. SSPC (Steel Structures Painting Council) - Paint 20 Zinc Rich Coating.

Z. SSPC (Steel Structures Paining Council)- Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments).

1.03 SYSTEM DESCRIPTION

A. Aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory finished, vision glass, glass insulated metal panel infill, related flashings, anchorage and attachment devices.

B. Exterior windows include tubular aluminum sections thermally broken, shop fabricated, factory finished, related flashings, anchorage and attachment devices.

C. Interior windows include tubular aluminum sections without thermally-broken framing, with slide-in 1/4-inch infill, glazing, adapter, shop fabricated, factory finished, related flashings, anchorage and attachment devices.

D. System Assembly: Site assembled.

1.04 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall:

1. As calculated in accordance with International Building Code, current edition.

2. As measured in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to flexure limit of glass, 1/200 of span; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft (0.0003 cu m/s/sq m)) of wall area, measured at a reference differential pressure across assembly of 1.57 psf (75 Pa) as measured in accordance with AAMA 501.2 ASTM E283.

E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

F. Water Leakage: None, when measured in accordance with AAMA 501,2m /ASTM E331 with a test pressure difference of 2.86 lbf/sq ft (136.85 N/sq m).

G. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components and anchorage.

H. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.05 SUBMITTALS FOR REVIEW

A. Section 013200 - Submittals: Procedures for submittals.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware and internal drainage details.

C. Design Data: Provide framing member structural and physical characteristics, calculations, dimensional limitations.

D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

E. Submit two samples 4 x 6 inches (100 x 150 mm) in size illustrating finished aluminum surface, glass units, infill panels, glazing materials.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Conform to requirements of ANSI A117.1.

C. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years documented experience.

D. Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Indiana.

1.07 PRE-INSTALLATION MEETING

A. Section 013100 - Coordination and Meetings: Pre-installation meeting.

B. Convene one week before starting work of this section.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Section 016000 - Material and Equipment: Transport, handle, store, and protect products.

B. Handle Products of this section in accordance with AAMA-Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.09 WARRANTY

A. Section 017700 - Contract Closeout.

B. Warranty: Warrant doors, frames, and factory installed hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

C. Standard Period.

1. Ten years starting on date of shipment.

D. Limited lifetime

1. Covers failure of corner joinery, core deterioration, and delamination or bubbling of door skin and corrosion of all-fiberglass products while the door is in its specified application in its original installation.

E. Provide ten (10) year manufacturer warranty glazed units.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Special-Lite: SL-15 Monumental, with SL-484 mid-panel.

B. All others must submit for approval.

2.02 MATERIALS

A. Extruded Aluminum: ASTM B221.

B. Sheet Aluminum: ASTM B209.

C. Sheet Steel: ASTM A446/A446M; galvanized in accordance with G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections.

E. Fasteners: Stainless steel.

2.03 COMPONENTS

A. Windows and Frames: 2" x 4-1/2" (50 x 113 mm) nominal dimension; thermally broken with interior tubular section insulated from exterior; applied glazing stops; drainage holes; internal weep drainage system. Frames for interior glazing need not to be thermally broken, use slide-in infill adapter for 1/4 inch glazing.

B. Doors: Special-Lite: Monumental SL-15 Wide Stile Door

C. Flashings: Aluminum Kynar finish as selected to match mullion sections where exposed.

D. Firestopping: Specified in Division 07.

2.04 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified 088000 as indicated on drawings.

B. Glazing Materials: As specified in Section 088000. Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 SEALANT MATERIALS

A. Sealant and Backing Materials:

1. Perimeter Sealant: Type Silicone as specified in Section 079200.

2. Sealant Used Within System (Not Used for Glazing): Type Silicone as specified in Section 079200.

2.06 HARDWARE

A. Hinges: Select continuous gear hinge.

B. Lockset: Best Core.

C. Push/Pull: SL-84 Door Pull on exterior

D. Exit Device: Von Duprin 99 series exit device.

E. Lock-Down: Trimco LDH-100 to replace exit device end cap.

F. Closer: LCN 4040 XP or LCN 4642 on ADA Automatic door.

2.07 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Reinforce interior horizontal head rail to receive drapery and blind track brackets and attachments.

F. Prepare components with internal reinforcement for door hardware.

G. Reinforce framing members for imposed loads.

2.08 FINISHES

A. Finish Coatings: Conform to AAMA 603.8, AAMA 605.2, AAMA 606.1, AAMA 607.1, AAMA 608.1.

1. Anodized Aluminum.

a. Class 1 Anodizing, minimum 0.7 mils thick.

1) Clear, Dark Bronze, Black, Light Bronze, Medium Bronze, Champagne

2. Painted Aluminum

a. KYNAR®.

1) Topcoat.

a) 70% KYNAR® or HYLAR® 5000 Coating, meets or exceeds all AAMA 2605 specifications, 2.5 to 4.0 wet mils,1.00 to 1.20 dry mils.

2) Color

a) Consult manufacturer.

B. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 2.0 oz/sq ft (610 gm/sq m). Primed with iron oxide paint.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

D. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.

E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

F. Extent of Finish:

1. Apply factory coating to all surfaces exposed at completed assemblies.

2. Apply finish to surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Section 013100 - Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify dimensions, tolerances, and method of attachment with other work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

D. Align assembly plumb level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill and edge flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install flashings and trim.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided.

L. Install glass and infill panels in accordance with Section 088000, to dry method of glazing.

M. Install perimeter sealant Type Silicone, backing materials, and installation criteria in accordance with Section 079200.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill and edge flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter air and vapor barrier materials.

I. Install flashings and trim.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 087100 for installation requirements.

L. Install glass and infill panels in accordance with Section 088000, to dry method of glazing.

M. Install perimeter sealant Type Silicone, backing materials, and installation criteria in accordance with Section 079200.

3.03 ERECTION TOLERANCES

A. Section 014000 - Quality Control: Tolerances

B. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 ADJUSTING

A. Section 017700 - Contract Closeout: Adjusting installed work.

B. Adjust operating hardware for smooth operation.

3.05 CLEANING

A. Section 017700 - Contract Closeout: Cleaning installed work.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION OF FINISHED WORK

A. Section 017700 - Contract Closeout: Protecting installed work.

B. Protect finished Work from damage.

END OF SECTION 084313

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SECTION 084411 – ALUMINUM CURTAIN WALLS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide materials, labor and equipment necessary to install the work of this Section in accordance with the intent of the Contract Documents. Items to this Section shall include but are not necessarily limited to the following:

1. Aluminum Window/Curtain Wall Frames (Type B as shown on the Drawings)
2. Anchors and attachments as required to secure any of the work in this Section.
3. Break metal enclosures between glazed openings as shown on the Drawings.

B. Related Work Specified Elsewhere:

1. Section 079200 Sealants
2. Section 088000 Glazing
3. Section 085200 Aluminum Windows

1.02 INDUSTRY STANDARDS

A. Publications of the following institutes and associations are referred to in this section.

1. American National Standards Institute, A.N.S.I.
2. Architectural Aluminum Manufacturer's Association, A.A.M.A.
3. American Society of Testing Materials, A.S.T.M.

1.03 SUBMITTALS

A. Shop drawings showing construction of all parts, metal thicknesses, installation and erection details including connections, anchorage, fastening, and sealing methods.

1. Include sections of typical members, dimensioned elevations, frame sizes, spacing of anchors and fasteners, and details of accessories.

B. Manufacturer's recommended installation and maintenance procedures.

C. Test Reports: Reports of source quality control tests.

D. Certificates: Manufacturer's certificate that materials meet specification requirements.

1.04 QUALITY ASSURANCE

A. The design and specifications are based on the 1600 S.S.G. Curtainwall, as manufactured by the Kawneer Company, Inc. It is not the intent of these specifications to restrict the products of this Section to one manufacturer. Equals must be approved in writing prior to bidding by the Architect.

B. Equal:

1. Wausau.
2. Efco.
3. Oldcastle Building Envelope.

1.05 GUARANTEE

A. Window Wall System shall be guaranteed against failure of materials or workmanship to include excessive leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess of normal weathering, and defects in hardware and weather stripping for two (2) years.

1.06 FIELD MEASUREMENTS

A. Obtain all necessary field measurements and accurately fit this work with the work of others.

1.07 PRODUCT PERFORMANCE

A. Submit a list of at least five (5) completed projects of similar nature and scope to the Architect listing name, locations and Architect.

B. Air infiltration shall be tested in accordance with ASTM E 283 and shall not exceed .06 CFM per square foot of fixed area.

C. Water infiltration shall be tested in accordance with ASTM E 331. No water penetration shall occur at a test pressure of 6.24 p.s.f.

D. Structural Performance shall not exceed a maximum deflection of 1/175 of the span under a windload of 30 p.s.f. in accordance with ASTM E330 and based on a safety factor for allowable stress of 1.65.

E. Thermal Barrier: There shall be a thermal separation between the exterior and interior metal surfaces.

F. Test requirements are minimum and any tests failing to meet the minimum requirements will be cause to reject the proposed window wall systems.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. General:

1. Sections shall be extruded from 6063 alloy and temper (ASTM B221 alloy G.S.10A-T5) or equivalent. Vertical and horizontal sections shall be provided with closed cell sponge insulating strips, forming a .125 inch thermal break between interior and exterior components.

2. All curtain wall sections shall be of overall dimensions, wall thicknesses and basic configurations as shown on architectural details. Tubular verticals and horizontals are to be positioned to the interior of building structure, and screw fastened pressure plates with covers to the exterior.

B. Joinery: Vertical sections shall run through and be flush with horizontal sections at interior and exterior faces. All frame intersections shall be coped or square cut. Curtain wall sections shall be completely factory fabricated and delivered to job site unassembled. The curtain wall field erector shall mechanically affix joinery with stainless steel and aluminum connection angles, and shall seal to assure watertightness.

C. Glazing: Curtain wall sections shall be designed for gasket glazing. All glazing pockets shall have a width of .312 inches plus glass or panel thickness, at a depth of 1.000 inch (when sections detailed have a 2.500 inch face). Glass or panels shall be retained in main sections by screw attached pressure plates at exterior face (allowing for installation or replacement from the exterior).

D. Gaskets: Glass and panels shall be retained in curtain wall sections by closed cell sponge, arrowed neoprene gaskets inserted in gasket holds of main window sections. Dense, arrowed, neoprene gaskets shall be inserted in gasket holds of exterior pressure plates. All gaskets shall be reusable for replacement glazing and shall be colored black.

E. Anchorage: Window units shall be secured to the building structure with allowances made for installation sequence, building movement, thermal movement of aluminum, and standard window opening construction tolerances. All materials employed shall be aluminum or noncorrosive materials compatible with aluminum; fasteners shall be stainless steel or cadmium plated steel, all steel clips and/or steel anchors, if used, shall be zinc plated. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum. All fasteners, expansion channels, clips and anchors, utilized as subject project requires, must be of adequate alloy, size and spacing to assure the structural integrity of window units.

F. Breakmetal enclosures shall be of 0.090" aluminum. The enclosures shall be formed, then anodized in the finish indicated in 2.02 A. of this Specification. Submit appropriate detailing in shop drawing submittal for Architect review.

2.02 FINISH

A. Finish Coatings: Conform to AAMA 603.8, AAMA 605.2, AAMA 606.1, AAMA 607.1, AAMA 608.1.

1. Anodized Aluminum.

a. Class 1 Anodizing, minimum 0.7 mils thick

1) Clear or Dark Bronze.

2. Painted Aluminum

a. KYNAR®.

1) Topcoat.

a) 70% KYNAR® or HYLAR® 5000 Coating, meets or exceeds all AAMA 2605 specifications, 2.5 to 4.0 wet mils,1.00 to 1.20 dry mils.

2) Color

a) As selected by Architect from manufacturer’s full range of standard colors; not mica or metallic.

B. Hardware: All exposed metallic hardware shall receive a protective clear lacquer to reveal the natural metal as specified for hardware.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Aluminum Wall System shall be erected by an experienced erector, approved by the Manufacturer and Architect.

B. Comply with manufacturer's instructions for installation.

C. Set system plumb, level, and true-to-line, without warp or rack of frames.

D. Anchor system solidly to surrounding construction to prevent distortion or misalignment.

E. Perimeter sealant work specified in Section 079200.

F. Glazing work specified in Section 088100.

3.02 FIELD REQUIREMENTS

A. Obtain all necessary field measurements and accurately fit this work with the work of others.

3.03 DISSIMILAR MATERIALS

A. All aluminum materials which will be placed in contact with concrete, masonry, mortar, plaster or dissimilar metals shall be back painted with a heavy coat of alkali-resistant bituminous paint.

END OF SECTION 084411

SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. The Conditions of the Contract, and all Sections of Division 1, are hereby made a part of this Section.

B. Section Includes: Factory glazed windows complete with reinforcing, shims, anchors, and attachment devices.

C. Related Sections:

1. Division 7 Section “Joint Sealants.”

2. Division 8 Section “Glass and Glazing.”

D. Coordinate work with that of all construction contractors affecting or affected by work of this Contract. Cooperate with such contractors to assure the steady progress of the Work.

E. The windows in this section are intended to replicate historic steel windows.

1.02 SYSTEM DESCRIPTION

A. General: In addition to requirements shown or specified comply with sitelines and profiles indicated on contract documents.

B. Window Replacement Requirements:

1. Work Included: Provide labor, materials and equipment necessary to complete the work of the Replacement Window Contract, and without limiting the generality there of include:

2. Removal of existing sash, fixed glazing, frames and other accessories as required by the proposed replacement system.

3. Removal of other existing work as required for the proper installation and operation of the new units.

4. Removal from site and legal disposal of all removed materials, debris, packaging, banding and all other surplus materials and equipment.

5. Provide new factory glazed, thermally broken, aluminum windows, types as specified herein, together with necessary mullions, panning, trim, expanders, operating hardware, installation hardware and all other accessories as required.

6. Insulated panels and frames as required in selected transoms and other locations.

7. Treated wood blocking, fillers and nailers as required for secure installation. Bidders shall survey conditions of existing sills and jambs prior to bidding. Contractor shall be responsible for providing new blocking for portions of same that are deteriorated.

8. Fiberglass insulation between window frames and adjacent construction where applicable.

9. Sealing of all joints within each window assembly.

10. Sealing of entire exterior perimeter of window units after installation.

11. Field observations and measurements of existing openings and conditions.

12. Furnishing and delivering of extra materials as specified.

C. Design Requirements:

1. Manufacturer/subcontractor is responsible for designing system, including installation instructions and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Requirements shown by details are intended specifically to establish dimension of unit, sight lines and profiles of members.
3. Provide assemblies free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
4. Installation instructions are to take into account specified site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
5. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
6. Evacuate water without infiltration to interior from exterior face of wall, water entering joints, and condensation occurring within windows, by drain holes and gutters of adequate size or other acceptable method.
7. Provide concealed fastening wherever possible.

D. Performance Requirements: Requirements for aluminum windows, terminology and standards of performance, and fabrication and workmanship are those specified and recommended in AAMA/WDMA/CSA 101/I.S.2/A440-08 and applicable general recommendations published by AAMA. Conform to more stringent of specified AAMA standards and following:

1. Air Infiltration Test: Not exceed 0.3 cubic feet per minute per foot of crack length when tested at a pressure of 6.24 psf. Perform tests in accordance with ASTM E 283 with the sash in a closed and locked position.
2. Water Resistance Test: Subject window unit to a water resistance test in accordance with ASTM E 331 and E547 with no water passing the interior face of the window frame and no leakage as defined in the test method. Mount the glazed unit in its vertical position continuously supported around the perimeter and the sash placed in the fully closed and locked position. When a static pressure of 8 pounds per square foot has been stabilized, apply five gallons of water per square foot of window area to the exterior face of the unit for a period of 15 minutes.
3. Uniform Load Deflection Test: ASTM E 330 at 40 pounds per square foot: No member deflection more than 1/175 of its span. Maintain test load for a period of 10 seconds resulting in no glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms or any other damage causing the window to be inoperable.
4. Uniform Load Structural Test: Apply a minimum exterior and interior uniform load of 60 pounds per square foot to the entire outside surface of the test unit. Maintain this test load for a period of 10 seconds. Results: No glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing the window to be inoperable. And no permanent deformation of any frame or vent member in excess of 0.2 percent of its span.
5. Life Cycle Test: Per AAMA 101 and AAMA 910, provide proof that the product meets the criteria including passing air and water tests at the conclusion of the cycle tests.
6. "U" Value Tests: (Co-efficient of Heat Transfer): Thermal Transmittance of Conduction with a 15 mph perpendicular dynamic wind: 0.53 BTU/hr/ft^2/F at vents and 0.32 BTU/hr/ft^2/F at fixed area when tested with specified clear-Low E insulating glass or the glazing to be supplied.
7. Testing: Where manufacturer's standard window units comply with the above performance requirements and have been tested by an AAMA certified independent laboratory showing compliance with such tests. Submit copy of the test report for both the operable vent and the fixed windows signed by the independent laboratory and less than 4 years old.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, recommendations and standard details for aluminum window units.

B. Shop Drawings: Submit shop drawings, including location floor plans or exterior wall elevations showing all window openings, typical unit elevations at 1/4 inch scale, and half size detail sections of every typical composite member. Show anchors, hardware, operators and other components as appropriate if not included in manufacturer's standard data. Include glazing details and standards for factory glazed units.

C. Samples:

1. Submit one sample of each required aluminum finish, on 3 x 3 inch long sections of extrusion shapes or aluminum sheets as required for window units.

2. Submit additional samples, if and as directed by Architect, to show fabrication techniques, workmanship of component parts, and design of hardware and other exposed auxiliary items.

3. Certifications: Submit certified test laboratory reports by independent laboratory substantiating performance of system. Include other supportive data as required or as necessary.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store and handle windows, mullions, panels, hardware and all pertinent items in strict compliance with the manufacturer's instructions.

B. Protect units adequately against damage from the elements, construction activities and other hazards before, during and after installation.

1.05 WARRANTY

A. Manufacturer's Warrantees: Submit written warrantees from window manufacturer for the following:

1. Windows: Windows furnished are certified as fully warranted against any defects in material or workmanship under normal use and service for a period of one (1) year from date of fabrication.

2. Finish: The pigmented organic finishes on exposed surfaces of windows and component parts (such as panning, trim, mullions and the like) are certified as complying fully with requirements of AAMA 2604 for pigmented organic coating and fully warranted against chipping, peeling, cracking or blistering and fading for a period of ten (10) years from date of installation.

3. Insulated Glass: Warranted from visual obstruction due to internal moisture for a period of twenty (20) years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Series SR6700 “Steel replication historic” fixed and vented window as manufactured by Graham Architectural Products, York, PA., utilizing profiles as indicated on bid documents.

B. Acceptable manufacturers, subject to compliance with requirements, include:

1. Quaker Windows and Doors.

2. Wausau Metals Corporation.

C. Thermal Barrier: Provides a continuous uninterrupted thermal barrier around the entire perimeter of the frame and all sash and not be bridged by any metal conductors at any point. Provide manufacturer's standard construction which has been in use on similar window units for a period of not less than three years, has been tested to demonstrate resistance to thermal conductance and condensation and has been tested to show adequate strength per AAMA 505.

D. Pre-Bid Qualifications:

1. All bids must be based on pre-qualified products. To qualify, the bidder must furnish one complete set of comparative literature and data 10 days prior to the time set for bids. Provide certified test reports from an accredited AAMA Laboratory verifying that the performance of the product meets or exceeds the criteria listed in section 1.2.E. Provide certification from the manufacturer that the proposed product meets or exceeds the listed requirements.
2. No verbal approvals will be given. Each submitter will be notified in writing of acceptance or rejection.
3. The manufacturer must verify that it has been engaged in the manufacturing of the product in their production facility for a period of five (5) years.
4. Maintenance manuals accompany the product sample being submitted for approval.
5. Sight lines to match the base product specified and the project bid documents.
6. The qualified bidder must verify that the bidder has been involved with the installation of this type of product in a minimum of 5 projects of similar scope and quality.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by window manufacturer for strength, corrosion resistance and application of required finish, but not less than 22,000 psi ultimate tensile strength, a yield of 16,000 psi. Comply with ASTM B 221.

B. Fasteners: Aluminum, stainless steel, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors and other components of window units.

1. Do not use exposed fasteners on exterior except where unavoidable for application of hardware. Match finish of adjoining metal.
2. Provide non-magnetic stainless steel, tamper-proof screws for exposed fasteners, where required, or special tamper-proof fasteners.
3. Locate fasteners so as not to disturb the thermal barrier construction of windows.

C. Anchors, Clips and Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with ASTM A 123.

D. Compression Glazing Strips and Weatherstripping: At manufacturer's option, provide neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC415, PVC gaskets complying with ASTM D2287, or expanded neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sealant:

1. Unless otherwise indicated for sealants required within fabricated window units, provide elastomeric type as recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking and non-migrating. Provide product complying with AAMA Specification 803 and 808.
2. Refer to Division 7 for perimeter sealants between window units and surrounding construction.

F. Insect Screens: (if required):

1. Fabric: 18 x 16 aluminum charcoal mesh retained in screen frames with vinyl splines that permit easy replacement.
2. Frames: Extruded aluminum sections or steel frames with corners mitered and crimped with corner gussets. Manufacturer’s standard finish.

2.03 WINDOW TYPES (OPERATION)

A. Fixed Aluminum Windows or Panel Frames (F):

1. No special hardware required.
2. Minimum Wall Thickness: 0.125 inches.
3. Minimum Frame Depth: 3.250 inches.

B. Accomplish combinations of operable and fixed units by providing continuous jamb construction. Splicing is not permitted along entire length of the jamb. Vertical and horizontal sight lines at all fixed glazed areas to operable vents shall not exceed 2.062 inches. True muntins supporting vent shall be 1.125" in sightline at fixed areas.

2.04 FABRICATION AND ACCESSORIES

A. General: Provide manufacturer's standard fabrication and accessories which comply with specifications. Include complete system for assembly of components and anchorage of window units and provide complete pre-glazing at the factory.

B. Window Material:

1. Windows and Muntin Bars: Aluminum.
2. Secondary Members (friction tabs, shoes, weatherstripping guides, etc.): Aluminum or a material compatible with aluminum.
    a. Main Frame and Vent: Nominal thickness of not less than 0.125 inches, except for fin trim either integral or applied. The vent shall overlap muntin frame and perimeter frame.
3. Vent Members: Not less than 2.250 inches in depth.

C. Master Frame: Not less than 3.250 inches in depth.

D. Hardware:

1. Material: Aluminum, stainless steel or other non-corrosive materials compatible with aluminum for hardware having component parts which are exposed. Cadmium or zinc-plated steel where used must be in accordance with ASTM Specification B 766 or B 633.
2. Primary Locking Devices: Cast cam action locks. When casement vent height exceeds thirty inches, two such locking devices will be required.
    a. Provide cast bronze cam action locks.

E. Ventilators:

1. Balance projected ventilators on two heavy-duty 300 series stainless steel 4 bar hinge assemblies. Hinges shall have symmetrical stainless steel end cap with controlled cam action of the vent. Provide brass slides with dual set screws for precision adjustment.
2. Limit Hardware:
    a. Use manufacturers standard hardware (Anderburg FA225) for opening restrictions.
    b. On top hinged units, use limit operating stay arms (Anderburg 88SS).
    c. Limit opening to 4 inches.

F. Thermal Barrier: Provides a continuous uninterrupted thermal barrier around the entire perimeter of the frame and all sash and shall not be bridged by any metal conductors at any point.

G. Construction:

1. Assembly: Miter and seal vents with a non-hardening mastic, forming a watertight joint. Structurally reinforce corners of the vent with aluminum gusset blocks and chemically weld, followed by crimping. Mechanical fasteners are not allowed.
2. Cope corners of the frame with two screws per corner into screw ports and back seal, forming a water-tight joint.

H. Mullions - Other structural members: When mullion units occur, whether they are joined by integral mullions, independent mullions or by a combination of frame members, the resulting members must be capable of withstanding the load outlined under Uniform Load specified load requirements, without deflecting more than 1/175th of its span. When independent or integral mullions are used to join windows, the mullions shall contain a thermal barrier as specified. Sightline shall be provided match to existing sightlines. Evidence of compliance may be by mathematical calculations.

I. Glazing:

1. Pre-glaze all units (except insulated panels as required for installation) at the factory with insulated glass as follows:

a. Typical Insulated Glass: Cardinal Low E 272 or equal. Overall thickness of 1 inch with two lites of 3/16 inch or thicker if size and loading require with a Low E coating on the #2 surface.

1) Primary Sealant: Polyisobutylene applied to the edge of the spacer.

2) Secondary Sealant: Silicone.

3) Air Spacer: Continuous metal spacer with formed corners and an in-line connector, containing desiccant. Spacer to be black.

4) Performance Criteria:

a) Visible Light Transmittance: 70%

b) U Value: .30

c) Solar Heat Gain Co-efficient: .40

2. Glaze units to allow for glass replacement without the use of special tools.

3. Insulated Panels: 1 inch total thickness with factory acrylic enamel exterior and interior smooth aluminum skins to match window frame finish. Provide tempered hardboard substrate on urethane core or other substrate as selected for the project. Install panels in accordance with manufacturer's recommendations.

J. Weather Protection:

1. Provide means of drainage for water and condensation which may accumulate in members of window units by use of two weeps per main frame member.

2. Do not position other material in such a manner as to obstruct the weep holes function.

K. Screens: Provide screens on operating vents and as indicated on the architectural plans.

L. Simulated True Muntin: The simulated muntin is a triple muntin system to simulate a true muntin appearance from exterior. Align muntins within the windows system and from window to window within an industry acceptable tolerance.

1. Exterior Grids: Finish matching the window system. Profile to match profiles indicated on contract documents and serve as a match to the true muntins. Fasten grid to sloped perimeter vent at each contact point. Two piece snap grids are not permitted as a substitute.

a. Unglazed openings at Louvers shall have exterior grids with reinforcement tube extrusion added at all horizontal grids which span full width of the opening, as indicated in drawings and as required. The tube reinforcement shall be screw attached to a perimeter frame which is set into the window glazing pocket as indicated on drawings. Reinforcement shall be removable to allow for future glazing.

2. Interior Grid: 1.125” x 0.062” aluminum bar or profile grid as applicable, finish to match window system.

3. Muntin In-between Glass: Aluminum muntin in glass simulates glass perimeter spacer between interior and exterior applied grid. Machine and mechanically fasten the intersections of muntin grids. Fasten the grid to the sloped perimeter vent at each contact point. Color: Black

2.05 CASING COVER SYSTEM: (Panning, Trims, Receptors, Mullions, Sills etc.)

A. Exterior Casing Covers (Panning, Receptors, Subsills, Sills, etc.): Provide extruded prime alloy aluminum 6063-T5 no less than nominal 0.078 inch wall thickness. Casing covers of less than 2 inches in depth from the window frame may be of 0.062 inch wall thickness.

1. Exposed screws, fasteners or pop rivets are not acceptable on the casing or mullion systems.

B. Exterior mullion covers: Extruded aluminum shape to provide rigidity, no less than nominal 0.062 inch wall thickness. Seal against the window sections with continuous bulbous vinyl weatherstrip interlocked within the mullion cover and sealant as required for a watertight installation.

C. Interior trim:

1. Interior Trim, Closures and Angles: As detailed, of extruded shapes no less than 0.062 inch nominal wall thickness or as required.

2. Snap Trim: Apply in full length without splices or with minimum spices ant spans exceeding 16’ and attach with clips spaced no more than 18 inches on center or as required to meet structural loading requirements. Clips shall be no less than 3 inches long. No exposed screws will be allowed on interior trim.

2.06 ALUMINUM WINDOW FINISHES

A. Provide manufacturer’s standard 2 coat Fluoropolymer 70% Kynar baked on, electrostatically applied enamel coating. Color to be selected from manufacturer’s standard colors custom non-exotic color as selected by the Architect, applied over manufacturer’s standard substrate preparation including cleaning, degreasing, and chromate conversion coating. Finish shall meet or exceed AAMA 2605. This finish is to be provided for all windows, except for those windows indicated on the Drawings to receive anodized finish.

B. Where indicated on the Drawings, Provide Class I, Color Anodized finish to all exposed areas of aluminum windows. Finish shall meet AAMA 611. Color: Dark bronze.

PART 3 - EXECUTION

3.01 PREPARATION

A. Existing Construction:

1. Do not remove existing windows until new replacements are available and ready for immediate installation. Do not leave any openings uncovered at end of working day, during wind-driven precipitation or during excessively cold weather.

2. Remove existing work carefully; avoid damage to existing work to remain.

B. Perform operations as necessary to prepare openings for proper installation and operation of new retrofit units or new construction units.

C. Verify openings are in accordance with shop drawings and Architects Drawings.

3.02 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work. In no case shall attachment to structure or to components of the window system be through or affect the thermal barriers of the window units.

B. Set units plumb, level and true to line, without warp or rack of frames or sash. Anchor securely in place. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action.

C. Wedge fiberglass insulation between frames of new windows and construction to remain, or between frames and new receptor as applicable. Compress fiberglass to no less than 50 percent of original thickness.

D. Set sill members and other members in bed of compound as shown, or with joint fillers or gaskets as shown, to provide weathertight construction. Seal units following installation and as required to provide weathertight system.

3.03 ADJUST AND CLEAN

A. Adjust operating vent and hardware to provide tight fit at contact points and at weatherstripping, for smooth operation and weathertight closure.

B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and moving parts.

C. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.

D. Existing windows and other materials removed from site become property of the Contractor who shall promptly remove same and legally dispose of at no additional cost to the Owner.

E. Comply with all applicable laws, rules and regulations.

3.04 PROTECTION

A. Initiate all protection and other precautions required to ensure that window units will be without damage or deterioration (other than normal weathering) at time of acceptance.

B. Send to Architect, with copy to Owner, written recommendations for maintenance and protection of windows following Substantial Completion of Window Contract.

END OF SECTION

SECTION 087100 – FINISH HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Finish hardware except as otherwise specified or specifically omitted herein.

B. Related Sections:

1. Section 062000 - Finish Carpentry: Installation of finish hardware.
2. Section 081113 – Hollow Metal Doors and Frames.
3. Section 081416 - Wood Doors.
4. Section 081429 - Veneer Wood Doors

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows
2. Cabinets of all kinds, including open wall shelving and locks.
3. Signs, except as noted.
4. Toilet accessories of all kinds including grab bars.
5. Installation.
6. Rough hardware.
7. Folding partitions, except cylinders where detailed.
8. Sliding aluminum doors.
9. Angle sill threshold.
10. Corner guards.

1.02 SUBSTITUTIONS & SUBMITTALS

A. Requests for substitutions must be made in writing 10 days prior to bid date to allow architect to issue an addendum. If proposing a substitute, submit that product data attached to one showing specified item and indicate savings to be made. No other substitutions will be allowed.

1. Items listed with no substitute manufactures have been requested by Owner to match existing.

1.03 SUBMITTALS

A. Submit in electronic format (PDF) the hardware schedule at earliest possible date prior to delivery of hardware. Organize schedule into "Hardware Sets" with an index of doors and heading, indicating complete designations of every item required for each door or opening. Include the following information:

1. Type, style, function, size, quantity and finish of each hardware item.
2. Name, part number and manufacturer of each item.
3. Location of hardware set cross referenced to indications on drawings both on floor plans and in door schedule.
4. Explanation of all abbreviations, symbols, and codes contained in schedule.
5. Mounting locations for hardware.
6. Door and frame sizes and materials.
7. Submit manufacture's technical data and installation instructions for the electronic hardware.
8. Provide samples of hardware for Owner review.

9. Catalog cuts.

B. Templates: Where required, furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from only one manufacturer, although several may be indicated as offering products complying with requirements.

2. Hardware supplier shall be a direct factory contract supplier who has in his employment a certified architectural hardware consultant (AHC) who is available at all reasonable times during the course of the Work, and for project hardware consultation to the Owner, Architect, and Contractor.

B. Schedule Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish function, or other quality of significance. See 1.02 A for substitutions.

C. Exit Doors: Openable at all times from the inside without the use of a key or any special knowledge or effort.

D. Fire-rated openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80. This requirement takes precedence over other requirements for such hardware. Provide only such hardware which has been tested and listed by UL for the type and size of door required, and complies with the requirements of the door and the door frame labels. Latching hardware, door closers, ball bearing hinges, and seals are required whether or not listed in the Hardware schedule.

1. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label on exit device indicating "Fire Exit Hardware."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at the Site: Individually package each unit of finish hardware complete with proper fastening and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

B. Deliver packaged hardware items at the times and to the locations (shop or field) for installation, as directed by the Contractor.

1.06 PROJECT CONDITIONS

A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.07 PRE-INSTALLATION MEETING

A. Schedule a hardware pre-installation meeting on site and discuss the installation of all types of hardware on the Project.

B. Meeting attendees shall be notified seven (7) days in advance and shall include the Architect, Contractor Hardware Installers, all Manufacturers Representative, any other effected sub-contractor or supplier and the Owner’s Locksmith.

1.08 WARRANTY

A. Provide guarantee from hardware supplier as follows:
   1. Closers: Ten years; except electronic closers: Two years.
   2. Exit Devices & Locksets: Three years
   3. All other Hardware: Two years.

PART 2 – PRODUCT

2.01 MANUFACTURERS

A. Approval of manufacturers other than those listed shall be in accordance with paragraph 1.02 A.

Item:	Manufacturer:	Approved:	Approved
Hinge	Hager	Stanley	
Cont. Hinges	Hager	Select	Pemko
Locks	Best	None	
Cylinders	Best	None	
Offline Electronic Lock	Schlage	None	
Closers	LCN	None	
ADA Closers	LCN	None	
Exit Devices	Von Duprin	None	
Lock-down	Trimco	None	
Interior Door Pulls	Hager	Rockwood	Ives
Exterior Door Pulls	Special-Lite	None	
Silencers	Hager	Rockwood	Ives
Kickplates	Hager	Rockwood	Ives
Mag Holder	Rixson	Dorma	LCN
Stops	Hager	Rockwood	Ives
Thresholds	National Guard	Zero	
Seals/Sweeps	National Guard	Zero	

B. Furnish all items of hardware required to complete the work in accordance with specifications and plans.

C. Carefully inspect Project for the extent of the finish hardware required to complete the Work. Where there is a conflict between these Specification and the existing hardware furnish finish hardware to specification.

2.02 MATERIALS

A. Locksets: All locksets and latchsets shall be extra-heavy-duty cylindrical with Best 7-pin interchangeable core. Lockset and Cores to be of the same manufacturer to maintain complete lockset warranty. Locks to have solid shank with no opening for access to keyed lever keeper. Keyed lever to be protected by means of a break-away mechanism to prevent forced entry, when excessive torque is applied, a replaceable part will shear. Lock chassis must be through-bolted (outside of the lock chassis prep to prevent rotation of chassis after installation. Lock manufacturer shall provide a three-year warranty, in writing, to the Owner, along with three copies

of the lock service manual. Strikes shall be 16 gauge curved brass, bronze or stainless steel with a 1" deep box construction, and have sufficient length to clear trim and protect clothing.

B. Mortise type Locks and Latches shall be heavy-duty with hinged, anti-friction, 3/4 inch throw latchbolt with anti-friction piece made of self lubricating stainless steel. Functions and design as indicated on the hardware groups. Deadbolt functions shall be 1 inch projection made of hardened stainless steel. both deadbolt and latchbolt are to extend into the case a minimum of 3/8 inch when fully extended. Furnish locksets and latchsets with sufficient curved strike lip to protect door trim. Provide locksets with 7-pin interchangeable core cylinders. All mortise cylinders shall have a concealed internal set screw for securing the cylinder to the lockset. The internal set screw will be accessible only by removing the core from the cylinder body. Locksets and latchsets to have self-aligning, thru-bolted trim. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated. Lever handles must be of forged or cast brass, bronze or stainless steel construction. Levers which contain a hollow cavity are not acceptable. Spindle to be such that if forced it will twist first, then break, thus preventing forced entry. Levers to be operated with a roller bearing spindle hub mechanism.

1. Grade 1 Cylindrical Locks shall have minimum 9/16 throw. All deadbolts shall have 1-inch minimum throw.
2. Comply with requirements of local security ordinances.
3. Lock Series and Design: Best 93K7 AB 15D & 45H7 A 15J Trim.
4. Cylinders: Best 7-Pin

C. Offline Electronic Lock:

1. Schlage AD200
2. Provide outside trim VD
3. Lock shall be compatible with Best keying system

D. Hinges: All exterior doors shall have continuous geared concealed leaf hinges. Furnish hinges with five knuckles and flush bearing. All hinge open widths shall be minimum, but of sufficient size to permit door to swing 180.

1. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
2. Provide hinges as listed in schedule.

E. Exit Devices:

1. Furnish all sets at wood doors with sex bolts unless otherwise specified.
2. Provide Trimco Lock-Down quick release devices on all acceptable dogging exit devices

F. Surface Door Closers: Full rack and pinion type with removable non-ferrous cover. Provide sex bolts at all wood doors. Place closers inside building, stairs, and rooms. Closers shall be non-handed, non-sized and adjustable.

1. Provide multi-size 1 through 6 at all doors rated or not.
2. Flush transom offset brackets shall be used where parallel arm closers are listed for doors with fixed panels over.
3. Drop brackets are required at narrow head rails.
4. Set exterior doors closers to have 8.5 lbs maximum pressure to open, interior non-rated at 5 lbs , rated openings at 12 lbs.

G. ADA Door Operators: LCN 4642 Series installed per manufacturer's recommendations and ADA Guidelines. Provide all necessary components needed for wireless operation unless otherwise noted on the Project Drawings.

H. Kickplates: Provide with four beveled edges, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish Type "A" screws to match finish.

I. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

J. Screws: All exposed screws shall be Phillips head.

K. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.

2.03 FINISH

A. Generally to be BHMA 626 Satin Chrome.

B. Protection Plates, Push, Pulls shall be BHMA 630.

C. Spray door closers to match other hardware, unless otherwise noted.

D. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.04 KEYING REQUIREMENTS

A. Provide construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished on the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner (by the local Best factory representative) prior to occupancy.

B. All cylinders shall be Best 7-pin, interchangeable core.

C. Permanent cores shall be sent uncombinated.

D. Furnish two (2) key blanks per core provided in the proper keyway configuration as directed by the University Locksmith

E. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Best Access Systems Factory Representative. All Construction cores and control keys remain the property of Best Access Systems.

PART 3 – EXECUTION

3.01 HARDWARE LOCATION

A. Hinges:

1. Bottom Hinge: 10 inches from door bottom to bottom of hinge.

2. Top Hinge: 5 inches from door top to top of hinge.

3. Center Hinge: Center between top and bottom hinge.

4. Extra Hinge: 6 inches from bottom of top hinge to top of extra hinge.

B. Lock: 38 inches from finished floor to center of lever or knob.

C. Push Bar: 44 inches from bottom of door to center of bar.

D. Push Plate: 44 inches from bottom of door to center of plate.

E. Pull Plate: 42 inches from bottom of door to center of pull.

F. Exit Device: 39-13/16 inches from finished floor to center of pad.

G. Deadlock Strike: 44 inches from floor, centered.

3.02 INSTALLATION

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Installation shall conform to local governing agency security ordinance.

3.03 ADJUSTING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

B. Inspection: Hardware supplier shall inspect all hardware furnished within 10 days of contractor's request and include with his guarantee a statement that this has been accomplished. Inspector or Contractor shall sign off the hardware as being complete and correctly installed and adjusted. Further corrections of defective material shall be the responsibility of his representative.

3.04 ADJUSTMENTS AND CLEANING

A. At final completion, and when HVAC is operational and balanced, installer shall make final adjustment to and verify proper operation of all door closers and other hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good condition. Hardware found to be disfigured, defective or inoperative shall be repaired or replaced.

3.05 SCHEDULE OF FINISH HARDWARE

A. Legend of listed manufacturers:

1. HA - Hager
2. BE - Best
3. VD - Von Duprin
4. LC - LCN
5. NG - National Guard
6. TR - Trimco

B. The items listed in the following "Schedule of Finish Hardware" shall conform throughout to the requirements of the foregoing specification. The last column of letters in the Hardware Schedule refers to the manufacturer abbreviation listed above.

C. The Door Schedule on the Drawings indicates which Hardware Set is used with door.

END OF SECTION 087100

SECTION 088000 - Glazing

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

B. Section Includes:

1. Transparent and translucent glass glazing for general and special purpose applications including: coated, float, heat-strengthened, impact resistant, insulating, low emissivity, laminated, spandrel and tempered glass.

2. Work Results: Manufacture, handle, deliver and install glazing systems as shown on the architectural drawings or as otherwise specified and in accordance with the requirements of the contract documents.

1.02 REFERENCES

A. Abbreviations and Acronyms:

1. AAMA: American Architectural Manufacturers Association
2. ANSI: American National Standards Institute
3. ASTM: Formerly the American Society for Testing and Materials
4. CPSC: Consumer Products Safety Commission
5. FT: Fully Tempered
6. GANA: Glass Association of North America
7. HS: Heat-strengthened
8. ICC: International Code Council
9. IGCC: Insulating Glass Certification Council
10. IGMA: Insulating Glass Manufacturers Alliance
11. LBNL: Lawrence Berkeley National Laboratories
12. LEED: Leadership in Energy & Environmental Design
13. Low-E: Low emissivity
14. LSG: Light to Solar Gain
15. NFRC: National Fenestration Rating Council
16. SHGC: Solar Heat Gain Coefficient
17. SC: Shading Coefficient
18. USGBC: The U.S. Green Building Council
19. VLT: Visible Light Transmittance

B. Definitions:

1. Deterioration of Coated Glass: Defects developing from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and

practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking and other indications of deterioration in metallic coating.

2. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture or film on interior surfaces of glass.

3. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delaminating material obstructing vision through glass and blemishes exceeding those allowed by referenced laminated glass standards.

4. Interspace or Airspace: The space between lites of any insulating glass unit that contains dehydrated air or a specified gas.

5. Manufacturer: A firm that produces primary glass or fabricated glass products as defined in referenced glazing publications.

C. Reference Standards: This section does not require compliance with standards, but is merely a listing of those used. If compliance is required, statements will be included in the appropriate Section.

1. ASTM C 1036 Standard Specification for Flat Glass.

2. ASTM C 1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

3. ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass.

4. ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

5. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation *(replaces ASTM E773, E774 CBA, CAN / CGSB 12.8).*

6. ASTM E 546 Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units.

7. ASTM E 576 Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position

8. ASTM E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings.

9. ASTM C 1349 Standard Specification for Architectural Flat Glass Clad Polycarbonate

10. ASTM F 3057 Standard Test Method For Electromagnetic Shielding Effectiveness Of Glazings.

11. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings.

12. BS EN 14179 Glass in building - Heat-soaked thermally toughened soda lime silicate safety glass.

13. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

1.03 SUBMITTALS

A. Samples: Submit 12-inch (305 mm) long samples of each type of glass indicated except for clear monolithic glass products and make-ups with Thermal Spacer (VTS™), and 12-inch (305 mm) long samples of each color required, except black, for each type of sealant or gasket exposed to view.

B. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.

C. Sustainable Design Submittals: Submit manufacturer's documentation verifying product content, origin or other attributes for projects requiring special sustainability provisions, to meet the USGBC's LEED requirements or other sustainable goals.

D. Warranties:

1. Provide a written 10-year warranty from date of manufacture for sputter coated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

2. Provide a written 10-year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

3. Provide a written 10-year warranty from date of manufacture for insulating glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.

4. Provide a written 12-year warranty from date of manufacture for insulating glass with a Viracon Thermal Spacer (VTS™). Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.

a. Provide a written 10-year warranty from date of manufacture for Viraspan ceramic frit including Digital Distinctions™ digitally printed ceramic ink. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.

B. Mock-ups: Before glazing, build mockups for each glass product indicated in section 2.5 Product Schedule to verify selections and to demonstrate aesthetic effects and qualities of materials and execution.

1. Construction: Build mockups with glass and glazing systems specified for the project, including typical lite size, framing systems and glazing methods.

2. Scheduling: Notify architect seven days in advance of dates and times when mockups will be available for viewing.

3. Quality Assurance: Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work. Accepted mockups may become part of the completed work if undisturbed at the time of substantial completion.

C. Publications: Comply with recommendations in the publications below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or in Article 1.2 References.

1. GANA Glazing Manual

2. GANA Engineering Standards Manual

3. GANA Laminated Glazing Reference Manual

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage and Handling Requirements:

1. Protect glass from edge damage during handling. For insulating units exposed to substantial altitude changes, comply with insulating glass manufacturers written recommendations for venting and sealing to avoid hermetic seal ruptures.

2. Storage and Protection: Protect glazing materials according to manufacturer’s written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.

1.06 SITE CONDITIONS

A. Ambient Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by the glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40°F (4.4°C).

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Listing:

1. Viracon.

2. Oldcastle.

B. Substitution Limitations: In some cases, it may be necessary to use the specified product without substitution, either to match work-in-place or to match similar products used in another facility or for another reason determined by the owner. Confirm constraints with the Owner or other Authority Having Jurisdiction.

C. Product Options: Obtain glass and glazing materials from one source for each product indicated. Coatings and finished assemblies, such as insulating units and laminated units, to be manufactured by the same fabricator in order to have a common source of warranty.

2.02 DESCRIPTION

A. Provide glazing systems capable of withstanding normal thermal movements, wind loads and impact loads, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.

2.03 PERFORMANCE / DESIGN CRITERIA

A. Glass Strength: Analysis shall comply with ASTM E 1300 Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat-treated) required to meet or exceed the following criteria based on project loads and in-service conditions.

1. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:

a. 8 breaks per 1000 for glass installed vertically or not 15 degrees or more from the vertical plane and under wind action.

b. 1 break per 1000 for glass installed 15 degrees or more from the vertical plane and under action of wind and/or snow.

2. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1” (25mm).

B. Thermal and Optical Performance: Provide glass products with performance properties specified in 2.5 Product Schedule. Performance properties to be manufacturer’s published data as determined according to the following procedures:

1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 7 computer program.

2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 7 computer program.

3. Solar optical properties: NFRC 300

2.04 FABRICATION

A. Flat Glass:

1. Shall comply with ASTM C1036 Standard Specification for Flat Glass, Type 1, Class 1 (clear) or Class 2 (tinted, heat-absorbing and light reducing) and Quality q3

2. ASTM C 1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C 1048 if annealed glass), Condition A (uncoated), B (spandrel glass, one surface coated), or C (other coated glass).

a. Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed except in the following applications; glass units with ceramic frit and base dimensions greater than 84”, 1/2” thick glass and base dimensions greater than 84” and all other configurations with base dimensions >96”.

b. Maximum peak to valley rollerwave 0.003” (0.08mm) in the central area and 0.008” (0.20mm) within 11.3” (287mm) of the leading and trailing edge.

c. For clear or low-iron glass 1/4” to 3/8” thick without ceramic frit or ink, maximum + or – 100 mD (millidiopter) over 95% of the glass surface.

d. Maximum bow and warp 1/32” per lineal foot (0.79mm).

e. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.

B. Insulating Glass:

1. Shall comply with ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.

a. Units shall be certified for compliance by the IGCC in accordance with the above ASTM test method.

2. The unit overall thickness tolerance shall be -1/16” (1.59mm) / +1/32” (0.79mm) for a 1” two ply insulating unit. Unit constructed with patterned or laminated glass shall be +/1/16” (1.59mm).

3. Shall comply with ASTM E 546 Standard Test Method for Frost Point of Sealed Insulating Glass Units.

4. Shall comply with ASTM E 576 Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position.

5. Sealed Insulating Glass Units to be double sealed with a primary seal of polyisobutylene or VTS™ and a secondary seal of silicone.

a. The minimum thickness of the secondary seal shall be 1/16” (1.59mm) for metal spacers and 5/32” (4.0 mm) for VTS™.

b. The target width of the primary polyisobutylene seal shall be 5/32” (3.97mm) and the target width of VTS™ shall be 1/4" (6.0 mm).

c. There shall be no voids or skips in the primary seal.

d. Up to a maximum of 3/32" of the spacer may be visible above the primary polyisobutylene sealant.

e. Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1/16” (1.59mm) by maximum length of 2” (51mm) with gaps separated by at least 18” (457mm) and a maximum width of 1/16” (1.59mm) by maximum length of 6” along the VTS™ splice. Continuous contact between the primary seal and the secondary seal is desired.

6. To provide a hermetically sealed and dehydrated space, lites shall be separated by a boxed spacer with bent corners and straight butyl injected zinc plated steel straight key joints or an extruded VTS™ thermal plastic spacer.

C. Laminated Glass:

1. Shall comply with ASTM 1172 Standard Specification for Laminated Architectural Flat Glass.

2. All laminated architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.

3. Laminated Glass products to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.

D. Coated Vision Glass:

1. Shall comply with ASTM C 1376 Standard for Pyrolytic and Vacuum Deposition Coatings on Glass.
2. Coated products to be magnetically sputtered vacuum deposition (MSVD).
3. Edge Deletion – When low-e coatings are used within an insulating unit, coating shall be edge deleted to completely seal the coating within the unit.
    a. The edge deletion should be uniform in appearance (visually straight) and remove 95% of the coating.

E. Ceramic Coated Glass Products:

1. Shall comply with ASTM C 1048 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated, Condition B.
2. Silk-screen pattern should be no more than 0.0625” (1.59 mm) off parallel from locating glass edge and no more than 0.125” (3.18 mm) from edges other than locating glass edge.
3. Silk-screen pattern shall have a maximum of a 0.03125” (0.79 mm) variation in dot, hole or line location.
4. Digital print should be no more than 1/16” (1.6 mm) off parallel from locating glass edge and no more than 1/8” (3 mm) from edges other than locating glass edge.
5. Digital print shall have a maximum of a 1/32” (0.8 mm) variation in dot, hole or line location.
6. Digital print may have an indefinite boarder of up to 1/32” (0.8 mm).

2.05 ACCESSORIES

A. Glazing Materials: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

1. Setting blocks to be 100% silicone with a durameter hardness of 85±5.

2.06 PRODUCT SCHEDULE

A. All products shall comply with ASTM Standards and requirements in Article 2.3 Materials.

B. Insulating Coated Glass:

1. 1” Overall Thickness Insulating Coated Glass
    a. Exterior Glass Ply: 1/4” Clear HS or FT
    b. Coating: VNE-63 or Equal on #2 Surface
    c. Airspace: 1/2” VTS Warm edge airspace, Argon gas
    d. Silicone: black
    e. Interior Glass Ply: 1/4” Clear HS or FT

2. Performance Requirements
    a. Visible Light Transmittance: 62%
    b. Solar Energy Transmittance: 24%
    c. U-V Transmittance: 5%
    d. Visible Light Reflectance Exterior: 10%
    e. Visible Light Reflectance Interior: 10%
    f. Solar Energy reflectance: 37%
    g. Winter Nighttime U-Value: .25
    h. Summer Daytime U-Value: .21
    i. Shading Coefficient: .33
    j. Solar Heat Gain Coefficient: .28

C. Insulating Coated Spandrel Glass:
1. 1” Overall Thickness Insulating Coated Glass
    a. Exterior Glass Ply: 1/4" Clear HS
    b. Coating: VNE-63 or Equal on #2 Surface
    c. Airspace: 1/2” VTS Warm edge airspace, Argon gas
    d. Silicone: Black
    e. Interior Glass Ply: 1/4” Clear with standard color spandrel #4 HS
2. Performance Requirements
    a. Winter Nighttime U-Value: .25
    b. Summer Daytime U-Value: .21

D. Acoustical laminated Glass: LG-1
1. 1/4” Clear laminated glass
    a. Exterior Glass Ply: 1/8” Clear - AN, HS or FT
    b. Interlayer: .030 clear pvb
    c. Interior Glass Ply: 1/8” Clear – AN, HS of FT
2. Performance Requirements: STC = 35

E. Acoustical laminated Glass: LG-2
1. 9/16” Clear laminated glass
    a. Exterior Glass Ply: 1/4” Clear - AN, HS or FT
    b. Interlayer: .060 clear pvb
    c. Interior Glass Ply: 1/4” Clear – AN, HS of FT
2. Performance Requirements: STC = 39

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Verify prepared openings for glazing are correctly sized and within tolerance. Verify that the minimum required face and edge clearances are being followed.

2. Verify that a functioning weep system is present.

3. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Immediately before glazing, clean glazing channels and other framing members receiving glass. Remove coatings not firmly bonded to substrates.

B. Demolition / Removal: Remove and replace glass that is broken, chipped, cracked or damaged in any way.

3.03 INSTALLATION

A. Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials including those in the GANA Glazing Manual except where more stringent requirements are indicated.

B. Prevent glass from contact with contaminating substances that result from construction operations such as weld splatter, fire-safing or plastering.

3.04 CLEANING

A. Clean excess sealant or compound from glass and framing members immediately after application using solvents or cleaners recommended by manufacturers.

END OF SECTION 088000

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SECTION 089119 – LOUVERS AND GRILLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum louvers.

B. Custom Grilles

1.02 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Submit product data.

C. Submit shop drawings.

D. Submit manufacturer's installation instructions and recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver and handle items under provisions of and manufacturer's instructions and recommendations.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS OF LOUVERS

A. Airline

B. Airolite

C. Airstream, Penn Ventilator Co.

D. American Warming and Ventilating

E. Construction Specialties, Inc.

F. Ruskin

G. Industrial

2.02 LOUVERS

A. Louvers shall be 4" deep and shall have extruded aluminum blades, extended sill, and box frame of not lighter than 0.081" thick 6063-T5 alloy.

B. Blades shall be on 4-1/2" centers with integral gutter and downspouts to drain the water from the louver blades, and concealed mullions.

C. Stationary louvers shall pass 1100 F.P.M. free area velocity with less than .1" of water gauge pressure drop and shall carry less than .03 ounces of water per square foot during a 15 minute period when tested in accordance with AMCA Standard 500.

D. Louvers shall bear the AMCA Certification Ratings seal for both air performance and water penetration.

E. Provide bird screens on all louvers 1/2" mesh .080" aluminum.

F. Finish: Dark bronze anodized, Class I; and 2-coat 70% PVDF Kynar 500 coating system in custom colors as selected by the Architect. See Drawings for finish indications.

2.03 CUSTOM GRILLES

A. Provide custom grilles as manufactured by Construction Specialties Inc. Aluminum grilles shall be 1-1/2" deep x 2" squares and a 2" flange. Grilles shall be powder-coated in a custom color as selected by the Architect.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

END OF SECTION 089119

SECTION 092116 – GYPSUM WALLBOARD SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Gypsum Wallboard is required on all interior walls and ceiling surfaces in this work as indicated on the Drawings.

1.02 PRODUCT HANDLING

A. Delivery and Handling:
   1. Deliver materials to the project site with manufacturer's labels intact and legible.
   2. Handle materials with care to prevent damage.
   3. Deliver fire-rated materials bearing testing agency label and required fire classification numbers.

B. Storage:
   1. Store materials inside under cover, stack flat, off floor.
   2. Stack wallboard so that long lengths are not over short lengths.
   3. Avoid over-loading floor system.
   4. Store adhesives in dry area. Provide protection against freezing at all times.

C. Protection: Use all means necessary to protect the materials of this section before, during and after installation, and to protect the installed work of other trades.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, and at no additional cost to the Owner.

1.03 QUALITY ASSURANCE

A. Use only qualified journeymen. In the acceptance or rejection of installed gypsum wallboard, no allowance will be made for lack of skill on the part of the drywall Subcontractor.

B. Where fire-resistive gypsum wallboard assemblies are required, adhere to assemblies and guidelines as published by the Gypsum Association in the current edition of the Gypsum Association's Fire Resistance Design Manual.

1.04 REFERENCES/STANDARDS

A. ASTM C36 -Gypsum Wallboard

B. ASTM C79 -Gypsum Sheathing Board

C. ASTM C442 -Gypsum Backing Board and Core Board

D. ASTM C514 - Nails for the Application of Gypsum Wallboard

E. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board

F. ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board or Water Resistant Backing Board

G. ASTM C840 - Application and Finishing of Gypsum Board

H. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board

I. ASTM E119 - Fire Tests of Building Construction and Materials

J. GA-201 - Gypsum Board for Walls and Ceilings

K. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board

L. GA-600 - Fire Resistance Design Manual

1.05 JOB CONDITIONS

A. Environmental Conditions:

1. Temperature: During cold weather, in areas receiving wallboard installation, maintain temperature storage between 55 degrees F. to 70 degrees F. (13 degrees C. to 21 degrees C.) for 24 hours before, during, and after gypsum wallboard and joint treatment application.

2. Ventilation:

a. Provide ventilation during and following adhesives and joint treatment application.

b. Protect installed materials from drafts during hot, dry weather.

B. Protection: Protect adjacent surfaces against damage and stains.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Gypsum Wallboard

1. Water resistant board shall be in thicknesses and locations as indicated on the drawings.

2. Regular board shall be in thickness as indicated on the drawings.

B. Concrete GFR wallboard

1. All surfaces to receive ceramic tile finish shall be covered with 7/16" concrete glass-fiber-reinforced wallboard.

C. Fasteners:

1. Gypsum wallboard screws

2. Screw length for wood or metal stud application:

a. Single layer 5/8" wallboard application: 1 5/8", Bugle head screw.

D. Grillage:

1. Running Channels: 1 1/2" cold rolled galvanized steel.

2. Cross furring channels: 3/4" cold rolled galvanized steel.

3. Hangers: Minimum of No. 12 gauge galvanized annealed wire.

4. Note: Gypsum wallboard lath suspension system 650 by Chicago Metallic Corporation is an acceptable equal.

E. Accessories:

1. Drywall Reveal Molding: Style WOM-625-75 by Fry Reglet Corporation.

2. Surface-Mounted Corner Guard: Type CGS-3 by Balco, Inc.

3. Color to be selected by Architect.

PART 3 – EXECUTION

3.01 INSPECTION

A. Check framing for accurate spacing and alignment.

B. Verify that spacing of installed framing does not exceed maximum allowable of thickness of wallboard to be used.

C. Verify that door frames are set for thickness of wallboard to be used.

D. Do not proceed with installation of wallboard until deficiencies are corrected and surfaces to receive wallboard are acceptable.

3.02 APPLICATION

A. General:

1. Use wallboard of maximum lengths to minimize end joints.
2. Stagger end joints when they occur.
3. Locate end joints as far as possible from center of wall or ceiling.
4. Abut wallboards without forcing.
5. Neatly fit ends and edges of wallboard.
6. Support ends and edges of wallboard panels on framing or furring members.
7. Follow manufacturer's installation recommendations.
8. Stagger vertical joints on opposite side of partition to occur on different
9. Place all board so that all joints occur at center of studs or furring channels.
10. Make all joints tight and accurate, keeping adjacent boards in flush planes.
11. Cut and fit boards neatly and accurately around electrical boxes, light fixtures, grilles, registers, diffusers, and similar items so that evidence of cutting and fitting will be concealed by cover plates, flanges, or trim.
12. Seal cut edges where such cuts occur in water-resistant board according to the manufacturer's recommendations.
13. Where full height walls and walls containing acoustic or thermal insulation are indicated on the drawings, install sealant at the perimeter of such gypsum drywall surfaces and around all items protruding through such surfaces. Refer to Section 09260, Acoustical Treatment for Partitions/Ceilings, for specific information.
14. Provide control joints in continuous runs of wall exceeding 30'-0" (vertical or horizontal). Coordinate the location of all control joints with the Architect prior to installation.
15. Provide control joints at all locations where secured to structural steel to provide isolation from wallboard secured to partition framing.

B. Single Layer Application:

1. Vertical surfaces: Space screws a maximum 8" o.c. in field of panel and 8" o.c. along vertical abutting edges. Stagger screws on abutting edges or ends.
2. Horizontal surfaces: Space screws maximum 6" o.c. in field of panel and 6" o.c. along abutting end joints. Stagger screws on abutting edges or ends.

C. Joint System

1. Prefill:
   a. Fill "V" grooves formed by abutting rounded edges of wallboard with prefill joint compound.
   b. Fill "B" joint flush and remove excess compound beyond groove.

c. Leave clear depression to receive tape.

d. Permit prefill joint compound to harden prior to application of tape.

2. Taping and finishing joints:

a. Taping or embedding joints:

1) Apply compound in thin uniform layer to all joints and edges to be reinforced.

2) Apply reinforcing tape immediately.

3) Center tape over joint, and seat tape into compound.

4) Leave approximately 1/64" (0.05mm) to 1/32" (.1mm) compound under tape to provide bond.

5) Apply skim coat immediately following tape embedment, but not to function as fill or second coat.

6) Fold tape and embed in angles to provide true angle.

7) Dry embedding coat prior to application of fill coat.

b. Filling:

1) Apply joint compound over embedding coat.

2) Fill taper flush with surface.

3) Apply fill coat to cover tape.

4) Feather out fill coat beyond tape and previous joint compound line.

5) Do not apply fill coat on interior angles.

6) Allow fill coat to dry prior to application of finish coat.

c. Finishing:

1) Spread joint compound evenly over and beyond fill coat on all joints.

2) Feather to smooth uniform finish.

3) Apply finish coat to taped angles to cover tape and taping compound.

4) Sand final application of compound to provide surface ready for decoration.

3. Filling and finishing depressions:

a. Apply joint compound as first coat to fastener depressions.

b. Apply at least two additional coats of compound after first coat is dry.

c. Leave filled and finished depressions level with plane of surface.

4. Finished beads and trim:

a. First fill coat:

1) Apply joint compound to bead and trim.

2) Feather out from ground to plane of the surface.

3) Dry compound prior to application of second fill coat.

b. Second fill coat:

1) Apply joint compound in same manner as first fill coat.

2) Extend beyond first coat onto face of wallboard.

3) Dry compound prior to application of finish coat.

c. Finish coat:

1) Apply joint compound to bead and trim.

2) Extend beyond second fill coat.

D. Metal Trim:

1. The drawings do not propose to show all metal trim required; verify with the Architect the precise locations and types of trim to be used.
2. Provide metal trim at all junctures of gypsum wallboard and dissimilar materials.
3. Carefully inspect the drawings and verify location of all metal trim required.
4. Install all trim in strict accordance with the manufacturer's recommendations, paying particular attention to make all trim installation plumb, level, and true-to-line with firm attachment to supporting members.

E. Grillages: Spacing of furring channels and runner channels, and the spacing and spans of runners shall not exceed the limits given for each shape in the "Metal Lath Association Specifications".

1. Running channels shall be spaced not over 3 feet on center and spans shall not exceed 4 feet (2 feet at light fixtures).
2. Suspend running channels directly from structure with 12 gauge hanger wire.
3. Cross furring channels shall be spaced not over 13-1/2" on center.
4. Hangers shall be spaced as specified above and within 6" of the ends of main runner runs and of boundary walls, girders, or similar interruptions of ceiling continuity. Main runner shall be properly positioned and leveled, and hangers shall be saddle tied along runner. Main runners shall not be let into nor come in contact with abutting masonry walls. Runner channels shall be located within 6" of the walls to channels shall be securely saddle tied with two strands of 16 gauge tie wire to main runners and shall not be let into or come in contact with abutting masonry walls. All openings shall be formed with carrying channels. All offsets and isolated areas shall be securely braced against sway.

3.03 ADJUST AND REPAIR

A. "Nail Pop":

1. When face paper is punctured, drive new screw approximately 1-1/2" (38mm) from defective fastening and remove defective fastening.
2. Fill damaged surface with compound.

B. Ridging:

1. Do not repair ridging until condition has fully developed - approximately 6 months after installation or one heating season.
2. Sand ridges to reinforcing tape without cutting through tape.
3. Fill concave areas on both sides of ridge with topping compound.
4. After fill is dry, blend in topping compound over repaired area.

C. Cracks:

1. Fill cracks with compound and finish smooth and flush.

END OF SECTION 092116

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SECTION 092117 – GYPSUM BOARD ACOUSTICAL WALLS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. At masonry and drywall partitions indicated as "Acoustical Walls" provide acoustical treatment including sound attenuation blankets, acoustical seals at perimeter of partitions and all penetrations and cutouts in partitions/ ceilings complete with all required accessories for prevention of sound transmission through and around the partitions/ceilings.

1.02 REFERENCES

A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

1.03 PERFORMANCE REQUIREMENTS

A. Surface Burning: ASTM E84 with a flame spread/smoke developed rating of 10/250.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance and limitation criteria.

B. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

B. Applicator: Company specializing in performing the work of this Section by manufacturer.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Concealed Acoustical Sealant: Non-drying, non-hardening, non-skinning, non-staining, non-bleeding, gunnable sealant for concealed applications per ASTM C 919.

B. Exposed Acoustical Sealant: Non-oxidizing, skinnable, paintable, gunnable sealant for exposed applications per ASTM C 919.

C. Sound Attenuation Blankets: FS HH-I-521, Type I; 3.0 pcf density, semi-rigid mineral fiber blanket without membrane. Class 25 flame-spread, thicknesses as indicated, but not less than 3" for friction fit.

PART 3 - EXECUTION

3.01 EXAMINATION/COORDINATION

A. Verify that opening and partition work are ready to receive the Work of this section.

B. Coordinate with the Work of other trades affecting the Work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other manner which may affect bond of acoustical material.

B. Remove incompatible materials which affect bond.

C. Install backing materials to arrest liquid material migration.

3.03 APPLICATION

A. Provide the following is required and indicated at acoustical walls. Comply with ASTM C 919 and manufacturer's recommendations for locations of beads.

B. Seal perimeter of sound-rated work as follows:

1. At partitions, provide continuous beads of acoustical sealant at juncture of both faces of runners of plates with floor and ceiling construction, and wherever work abuts dissimilar materials. Seal prior to installation of gypsum boards.

2. At ceilings, provide continuous beads of acoustical sealant wherever work abuts dissimilar materials or gypsum wallboard partitions where indicated on the Drawings.

C. At control joints, provide continuous bead of sealant between edges of wall construction. Seal prior to installation of surface-applied control joint accessories and locate at proper depth in joint to allow for inserting of expansion portion of control joint accessory.

D. Provide double seal of multi-layer partition faces. Install face layer with 1/4" edge clearance at terminations of work, and install continuous bead of acoustical sealant all around.

E. At openings and cutouts, fill open spaces between edges of wall construction and fixtures, cabinets, ducts and other flush or penetrating items and fill and pack tightly with glass or mineral fiber insulation of 1.5 pcf density or sound attenuation blankets and seal with continuous bead of acoustical sealant.

F. Seal sides and backs of electrical boxes to completely close up openings and joints with a bead of acoustical sealant with maximum joint of 1/4" between drywall edge and box.

G. Sound Flanking Paths: Where sound-rated partitions intersect non-rated partitions and other sound-rated partitions, extend sound-rated construction to completely close sound flanking paths through non-rated construction. Seal joints between face layers at vertical interior angles of intersecting partitions.

H. Ceiling Plenums: Where sound-rated partitions extend through non-sound rated ceilings to structural substrates above, extend the same treatment to that portion of the partition above the ceiling as specified for portion below the ceiling.

I. Partition Insulation: Install sound attenuation blankets, in partitions where indicated. Completely blanket space between studs to full height of partitions. Fit carefully behind electrical outlets and other work which penetrate partitions for tight fit. Attach to back face of gypsum board in accordance with manufacturer's instructions.

J. Ceiling Insulation: Install sound attenuation blankets on gypsum board in ceilings where indicated. Completely blanket ceiling area, and lay over interrupting items where possible. Abut penetrating work tightly.

3.04 CLEANING

A. Clean adjacent surfaces of acoustical materials.

END OF SECTION 092117

SECTION 093113 – CERAMIC FLOOR TILE

PART 1 – GENERAL

1.01 GENERAL

A. Ceramic tile floor and base finish using the thinset application method.

1.02 REFERENCES

A. ANSI A108.1 - Installation of Ceramic Tile with Portland Cement Mortar.

B. ANSI A108.3 - Quarry Tile and Paver Tile Installed With Portland Cement Mortar.

C. ANSI A108.4 - Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive.

D. ANSI A108.10 - Installation of Grout in Tilework.

E. ANSI A118.4 - Latex-Portland Cement Mortar.

F. ANSI A118.6 - Ceramic Tile Grouts.

G. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.

H. ANSI A137.1 - Standard Specifications for Ceramic Tile.

I. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Product Data: Provide instructions for using adhesives and grouts.

C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements and ANSI A137.1.

1.04 MAINTENANCE DATA

A. Submit under provisions of Section 01770.

B. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery, store, protect and handle products to site under provisions of Section 01600.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in an unventilated environment.

B. Maintain a minimum 50 degrees F (10 degrees C) during installation of mortar materials.

1.08 EXTRA MATERIALS

A. Furnish under provisions of Section 017700.

B. Provide 10% or 100 sq. ft., whichever is the lesser amount, of each size, color, and surface finish of tile specified.

PART 2 - PRODUCTS

2.01 TILE MANUFACTURERS

A. Wall and Backsplash Tile

1. American Olean

2.02 BASE MATERIALS

A. Base: Match floor tile for moisture absorption, surface finish, and color.

2.03 MORTAR MATERIALS

A. Manufacturers: Latex-Emulsion-Based Latex-Portland Cement Mortars.

1. Mapei Corp.
2. American Olean Tile, Co, Inc.
3. W.R. Bonsal Co.
4. Bostik Construction
5. Laticrete International, Inc.

B. Mortar Materials: ANSI A118.4 Latex Modified, Portland cement, sand, latex additive, and water.

2.04 GROUT MATERIALS

A. Manufacturers: Acrylic Emulsions for Latex-Portland Cement Grouts.

1. Mapei Corp.
2. American Olean Tile Co., Inc.
3. W.R. Bonsal Co.
4. Bostik Construction Products Div.
5. Laticrete International, Inc.

B. Grout: ANSI A118.6, tile grout, color as selected.

C. Grout: ANSI A118.8, modified epoxy emulsion mortar and grout, color as selected.

D. Color Admixture: Color as selected, manufactured by SGS or by manufacturer of tile and mortar materials.

2.05 MORTAR MIX AND GROUT MIX

A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions and TCA Handbook.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify substrate under provisions of Section 010390.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Protect surrounding work from damage or disfiguration.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Apply sealer or conditioner to substrate surfaces in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - THINSET METHOD

A. Install adhesive, tile, and grout in accordance with manufacturer's instructions and to TCA Handbook.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Place edge strips at exposed tile edges, as required.

D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.

E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control joints free of adhesive or grout. Apply sealant to joints.

H. Allow tile to set for a minimum of 48 hours prior to grouting.

I. Grout tile joints.

J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 CLEANING

A. Clean work under provisions of 017700.

B. Clean tile and grout surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 017700.

B. Do not permit traffic over finished floor surface for 4 days after installation.

3.06 SCHEDULE

A. See Room Finish Schedule.

END OF SECTION 093113

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SECTION 095113 – SUSPENDED ACOUSTICAL CEILINGS

PART 1 -GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system and perimeter trim.

B. Acoustical tile and panels.

C. Non-fire rated assembly.

D. Supplementary acoustical insulation over system units.

1.02 REFERENCES

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E580 - Practice for Application of Ceiling Suspended Systems for Acoustical Tile and Lay-in panels in areas requiring seismic restraint.

D. ASTM E1264 - Classification of Acoustical Ceiling Products.

E. Ceilings and Interior Systems Contractors Association (CISCA) - Acoustical Ceilings: Use and Practice.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finished, interrelation of mechanical and electrical items related to system and wall layouts.

C. Product Data: Provide data on metal grid system components, acoustical units and accessories.

D. Samples: Submit two samples full size illustrating material and finish of acoustical units.

E. Samples: Submit two samples each, 12 inches (300 mm) long, of suspension system main runner, cross runner, edge trim, and hold down clips.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

A. Grid Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for combustibility requirements for materials.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 SEQUENCING

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

A. Furnish under provisions of Section 017700.

B. Provide 5 percent of total acoustical unit area of extra tile panels, but not less than one full carton, to Owner.

PART 2 – PRODUCTS

2.01 MANUFACTURERS - SUSPENSION SYSTEM

A. Chicago Metallic Corp.

B. Armstrong Contract Interiors.

C. Donn by U.S.G. Interiors, Inc.

2.02 SUSPENSION SYSTEM MATERIALS

A. Non-fire Rated Grid: ASTM C635, heavy duty; exposed T as indicated: components die cut and interlocking.

B. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

C. Exposed Grid Surface Width: 15/16 inch (24 mm).

D. Grid Finish: White and color as indicated.

E. Accessories: Stabilizer bars clips splices edge moldings hold down clips and for suspended grid system.

F. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, a ceiling system flatness requirement specified.

2.03 MANUFACTURERS - ACOUSTICAL UNITS

A. U.S.G. Interiors, Inc. Product as schedule.

B. Armstrong Contract Interiors Product as scheduled.

C. Celotex Building Products Product as scheduled.

2.04 ACOUSTICAL UNIT MATERIALS

A. Armstrong Type 737
   1. Recessed Angular Tegular
   2. Size: 24" x 24" x 5/8"
   3. Grid: 15/16" DX
   4. Color: White

2.05 ACCESSORIES

A. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - LAY IN GRID SUSPENSION SYSTEM

A. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section.

B. Install system in accordance with ASTM E580.

C. Install system capable of supporting imposed loads to a deflection of 1/240 maximum.

D. Lay out system as indicated on reflected ceiling plans.

E. Supply hangers or inserts for installation with instructions for their correct placement.

F. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches (150 mm) of each corner; and support components independently.

K. Do not eccentrically load system, or produce rotation of runners.

L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

M. Form expansion joints as required. Maintain visual closure.

3.03 INSTALLATION - CONCEALED GRID SUSPENSION SYSTEM

A. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section.

B. Install system in accordance with ASTM E580.

C. Install system capable of supporting imposed loads to a deflection of 1/240 maximum.

D. Lay out system to a balanced grid design as indicated on reflected ceiling plans and/or electrical lighting plans.

E. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

F. Supply hangers or inserts for installation with instructions for their correct placement.

G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located with 6 inches (150 mm) of each corner; and support components independently.

K. Do not eccentrically load system, or produce rotation of runners.

L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

M. Form expansion joints as required. Maintain visual closure.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.

D. Install units after above ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.

F. Cut tile panels to fit irregular grid and perimeter edge trim. Field rabbet tile panel edge. Double cut and field paint exposed edges of tegular units.

G. Where bullnose concrete block corners round obstructions occur, provide preformed closers to match edge molding.

H. Lay acoustical insulation horizontally above ceiling for a distance of 48 inches (1 200 mm) either side of acoustical partitions.

I. Install hold-down clips to retain panels tight to grid system within 20 ft (6 m) of an exterior door.

3.05 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 095113

SECTION 096423 – WOOD FLOORING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Furnish and install hardwood flooring assemblies as shown on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Qualifications of Installers: For the installation of the hardwood flooring, use only thoroughly trained and experienced installers who are completely familiar with the materials specified, the manufacturer's recommended methods of installation, and the requirements of this Work. The installer shall be a company specializing in the application of the Work in the Section having a minimum of 10 years documented experience and who is approved by the manufacturer.

B. The manufacturer shall be a company specializing in manufacturing the products specified in this Section with a minimum of 10 years documented experience.

C. Manufacturer's Recommendations: The manufacturer's recommended methods of installation, when approved by the Architect, shall be the basis for acceptance or rejection of actual methods of installation used in this work.

1.03 SUBMITTALS

A. Before any of the materials of this section are delivered to the job site, submit product literature and samples to the Architect in accordance with Section 013200 of these specifications.

B. Submit product data for floor finish materials.

C. Submit copies of maintenance data including recommended cleaning methods, cleaning materials, stain removal methods, polishes and waxes.

D. Submit two samples 6 3/4" x 12" in size illustrating floor finish, color and sheen.

E. Submit manufacturer's and MFMA installation instructions under provisions of Section 01300.

F. Suppliers shall submit certificates attesting that the materials furnished will meet specifications for grade, quality, dryness and treatment if required.

G. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, and at no additional cost to the Owner.

1.04 STANDARD OF QUALITY

A. Design is based on standards as established by the Maple Flooring Manufacturer's Associates (MFMA). All products and installation shall meet or exceed MFMA recommendations.

B. Acceptable Manufacturers: Cincinnati Flooring Company

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame spread rating of finished floor surface.

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall not be delivered or installed until all masonry, painting, plastering, tile work, marble and terrazzo work are completed and all overhead mechanical work and lighting are installed. Room temperature shall be at least 65 degrees and relative humidity of 50% - 60%.

B. Area where materials are stored is to be maintained at 65 degrees and under 50% humidity by the General Contractor.

C. Moisture content in maple flooring at time of delivery to be 6 - 9% average.

D. Deliver materials to permit moisture content to stabilize to ambient conditions.

1.07 JOB CONDITION - SEQUENCE

A. Do not install floor system until concrete has been cured 60 days and the requirements in Paragraph 1.06 A. are obtained.

B. After floors are finished, they are to be kept locked by the General Contractor to allow curing time for the finish. If, after the required curing time, the General Contractor requires use of the area, the floor shall be protected by covering it with non-fibered kraft paper or red rosin paper with taped joints until acceptance by the Architect of the completed floor.

1.08 GUARANTEE

A. Guarantee for two year(s) is to be provided by the manufacturer and the Installer and is subject to such limitations as contained in those guarantees.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not install wood flooring until wet construction work is completed and ambient air at installation space has the moisture content stabilized.

B. The General Contractor shall provide permanent heat, light and ventilation prior to installation.

C. The General Contractor shall maintain minimum room temperature 65 degrees F for a period of 2 days prior to delivery of materials during and after installation.

PART 2 – PRODUCTS

2.01 MATERIALS FOR PLATFORM FLOORING

A. Flooring: Species and grade stamped on underside of each piece, conforming to the following:

1. Species: White Hard Maple (Acer Saccharum)
2. Grade: First
3. Cut: Plain Sawn
4. Moisture Content: 7 to 10 Percent
5. Actual Thickness: 33/32 Inch
6. Actual Width: 2-1/4 Inches
7. Edge: Tongue and Groove
8. End: End Matched
9. Length: Random

B. Sheet Vapor Barrier: 8 mil thick, black polyethylene, with 2 inch wide tape for sealing

C. Plywood Sheathing: 3/4" CDX Fir Plywood, minimum 4 plys, 2 layers of sheathing

D. Sheathing Paper: Asphalt impregnated building paper

E. Nails: Type recommended by flooring manufacturer

F. Adhesive: Water resistive type as recommended by flooring manufacturer

G. Floor Finish: Two component polyurethane type recommended by flooring manufacturer, in a satin finish.

2.02 MATERIALS (GENERAL WOOD FLOORING)

A. Nailers
   1. Wood nailers 2" x 4" Pine or Construction Grade Douglas Fir or Western Hemlock pressure-treated by Osmose Wolman Salts or Dry Vac process or a 5-minute equivalent concentrated Penta immersion treatment with WOODLIFE or mineral spirit base (3 parts mineral spirits to 1 part concentrated Penta) as approved by the Bureau of Standards. Set at 16" o.c.

B. Shims, as required.
   1. Compressed fibre type 2-1/2" x 1-1/2"

C. Anchors
   1. Rawl drive anchors, minimum length 3", depending on shim requirements

D. Sub-flooring
   1. 3/4" CDX Fir Plywood, minimum 5-ply material

E. Flooring
   1. Finish flooring 25/32" x 2 1/4" kiln-dried, tongue and grooved, end match Northern Hard Maple (Acer Saccharum) First Grade, plain sawn

F. Nails
   1. 2" barbed cleats

G. Sanding Materials
   1. Specifically manufactured for sanding maple flooring of appropriate size and abrasive quality

H. Finishing Materials
   1. CFC Miracle sealer and CFC Miracle finish especially designed for end use desired.
   2. Shall be approximately 30% solids for sealer and 40% solids for finish per WSFI specifications.
   3. Sealer and finish shall be non-darkening and slip-resistant, in a satin finish.
   4. Buffing material shall be #100 screenback pads or equivalent steel wool pads.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Condition of Surfaces:
   1. Sublayment shall be inspected for proper surface conditions and sufficient anchorage to the floor deck.
   2. Do not start work until unsatisfactory conditions are corrected.
   3. Do not start work until masonry and plaster work are completed.
   4. The Flooring Contractor shall inspect the concrete subfloor for levelness. Beginning of installation shall mean that the Installer accepts the existing surface.
   5. Verify that required floor-mounted utilities are in the proper locations.
   6. The subfloor shall be broom cleaned by the General Contractor.

B. Discrepancies:
   1. In the event of discrepancy, immediately notify the Architect.
   2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION OF PLATFORM FLOORING

A. Plywood: Roll 8 mil black polyethylene film out loose over entire slab area, with edges lapped 4". Plywood shall then be loose laid over entire area with 3/4" space left at wall line and 1/4" to 1/2" between all panels. Long dimension of plywood panels shall be parallel to longest dimension of the room and with ends staggered. When all panels are in place, they shall be fastened to concrete with powder-actuated fasteners, shot through plywood into slab. Fasten center of panel first, then edges, using 9 or more fasteners. Apply second layer of plywood with joints staggered in both directions to first layer and fasten to base layer. Comply with printed instructions of the American Plywood Association (APA).

B. Predrill and blind nail flooring in accordance with manufacturer's instructions.

C. Lay flooring symmetrical to room center line.

D. Lay flooring strips parallel to width of room areas.

E. Arrange strips with end matched grain set flush and tight.

F. Provide divider strips where flooring terminates with other floor areas.

G. Provide 2 inch expansion space at walls as detailed.

3.03 INSTALLATION WOOD FLOORING

A. Install nailers/sleepers 16" on center running the short dimension of the above area and shimmed to level with compressed fibre shims placed under sleepers. Anchor every 30" using expansion and staggered in adjacent rows. Additional anchors shall be placed within 6" of each end of the nailers.

B. The space between the concrete floor slab and the underside of the plywood substrate shall be limited to 100 sq. ft. of open area between wood sleeper members (or 2 x 4 cross members between sleeper members) for purposes of firestopping. Firestop blocking members shall be of the same material as the sleepers.

C. Sublayment shall be laid with the surface gain of the outer wood plies at right angles to the joists, leaving 1/8" space between panels and with end joints staggered 4 feet. Sublayment shall be nailed to all bearings with 8d or 10d common nails spaced 6-8 inches apart.

D. Hardwood flooring shall be blind nailed through the subfloor and into the nailers with 2" machine driven fasteners, 7d or 8d screw, or cut nail at 10 to 12 inches apart.

E. Flooring strips shall be stacked square with room in the direction indicated on the drawings. The first strip shall be face nailed, leaving 3/4" expansion space from base or wall.

F. At least 3/4" expansion space shall be left at all walls to be covered by base molding.

G. Sanding:

1. Sanding shall not be done until all other interior work has been completed, and just before applying the final coat of finish to the base molding.
2. The floor shall be swept clean. Use no water.
3. Sand flooring with a drum sander, edger, buffer and hand scraper, using rough, medium and fine paper.
    a. The first sanding cut should be made at a 45^{o} angle to the direction of the finish floor using #36 grit paper.
    b. The second sanding cut should be exactly as the first only in the opposite direction.
    c. The third cut should be a straight cut running the direction of the finish floor using #36 grit paper.

d. The fourth cut is another straight cut using #60 grit paper.
e. The last sanding cut is also straight using #100 grit paper.
f. The floor should then be screened off using a slow speed buffing machine and #100 screenback pads.
g. Vacuum floor before first coat of finish.
h. Floor shall present a smooth surface without stop marks, gouges, streaks or shiners.

3.04 FINISHING

A. Mask off adjacent surfaces.

B. Apply finish in accordance with floor finish manufacturer's instructions.

C. Apply two coats of penetrating sealer and two coats of finish with coverages in accordance with manufacturer's instructions.

D. Screenback or steel wool and vacuum or tack between each coat after it is dry.

E. Flooring in the Art Gallery shall present a uniform matte surface without misses or holidays.

F. The flooring finish on the Platform shall present a uniform matte surface without misses or holidays. It is imperative that this be confirmed with the Architect prior to application.

3.05 PROTECTION

A. During and after the installation of the floor, the floor shall be protected from traffic. Damaged flooring shall be removed and replaced at the Contractor's expense.

3.06 CLEAN-UP

A. Upon completion of the flooring installation work, the Flooring Contractor shall remove any unused materials and shall clean up any cut offs, saw and sanding dust and other debris. The latter is to be placed in a container provided by the General Contractor.

END OF SECTION 096423

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SECTION 096513 – RESILIENT WALL BASE AND ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes resilient wall base and flooring accessories.

B. See Division 09 Sections “Resilient Tile Flooring”.

1.02 SUBMITTALS

A. Product Data: For each product indicated.

B. Below assumes manufacturer's standard-size samples are acceptable. Revise to suit Project.

C. Samples: For each product and for each color, pattern, and texture required.

1.03 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient accessories for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods.

B. After installation, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient accessories after other finishing operations, including painting, have been completed.

1.04 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Furnish not less than 10 linear feet (3 linear m) of each different type, color, pattern, and size of resilient product installed.

PART 2 – PRODUCTS

2.01 WALL BASE

A. See "Listed Manufacturers" Article in the Evaluations for cautions about naming manufacturers and products.

B. Refer to Division 01 Section "Product Requirements."

C. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.
2. Roppe Corporation.
3. Johnsonite, Division of Duramax, Inc.
4. Others as approved equal.

D. Wall Base: Rubber, FS SS-W-40, Type I.

1. Color and Pattern: As selected from manufacturer's full range.
2. Style: Cove with top-set toe
3. Minimum Thickness: 1/8 inch
4. Height: 4 inches

5. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet
6. Outside Corners: Job formed.
7. Inside Corners: Job formed.
8. Surface: Smooth.

2.02 RESILIENT ACCESSORY MOLDING

A. See "Listed Manufacturers" Article in the Evaluations for cautions about naming manufacturers and products.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Johnsonite, Division of Duramax, Inc.
2. Roppe Corporation.
3. Others as approved equal.

C. Description: Carpet edge for glue-down applications, reducer strip for resilient flooring.

1. Material: Rubber.
2. Color: As selected from manufacturer's full range.
3. Profile and Dimensions: as required for application.

2.03 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement-based or blended hydraulic cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Before installing resilient wall base and accessories:

1. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
2. Move resilient products and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer. Install products only after they are at the same temperature as the space where they are to be installed.

B. Use trowelable leveling and patching compounds to fill cracks, holes, and depressions in substrates.

1. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Adhesively install resilient wall base and accessories. Place resilient products so they are butted to adjacent materials.
3. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

4. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
5. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
6. Do not stretch base during installation.
7. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
8. Form outside corners on job, from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
9. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.
10. Install reducer strips at edges of flooring that otherwise would leave exposed edges.
    a. At doors, install reducer strips to be hidden by the closed door.
11. Immediately after installing resilient products, remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.

END OF SECTION 096513

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SECTION 096516 – RESILIENT TILE FLOORING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Polyester Composition Tile flooring.

1. Polyester Composition Tile Flooring

B. Related Sections: Sections related to this section include:

1. Concrete: Refer to Division 3 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
2. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 648-88 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
2. ASTM E 662-83 Test Method for Specific Density of Smoke Generated by Solid Materials.
3. ASTM F 710-86 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
4. ASTM F 970-87 Test Method for Static Load Limit.
5. ASTM 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
6. ASTM 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
7. ASTM 2982 Standard Specification for Polyester Composition Floor Tile

B. Federal Specification (Fed Spec):

1. Fed Spec L-F-475A Floor Covering, Vinyl, Surface (Tile and Roll), with Backing, February 1971.

C. National Fire Protection Association (NFPA):

1. NFPA 253-1984 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
2. NFPA 258-1989 Test Method for Specific Density of Smoke Generated by Solid Materials.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with "Conditions of the Contract" and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer's SPEC-DATA product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.

1. Grounding Diagram: Submit grounding diagram indicating location of grounding straps.

D. Samples: Submit selection and verification samples for finishes, colors, and textures.

E. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.

3. Manufacturer's Instructions: Manufacturer's installation instructions.

4. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

F. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

1. Certificate: When requested, submit certificate indicating qualification.

B. Regulatory Requirements:

1. Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing products in accordance with ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:

a. Critical Radiant Flux: Class 1 Rating per NFPA 253 (ASTM 648) (0.45 watts/cm² or greater).

b. Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

C. Mock-Ups: Install at project site, if required, a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standard.

1. Mock-up size shall be as determined by the Architect/Engineer.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

D. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 01 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs. prior to, during and after installation.

1.07 PROJECT CONDITIONS

A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of 85ºF (29ºC) for at least 72 hours before, during, and for not less than 72 hours after installation. Thereafter, maintain a minimum temperature of 68ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to the Armstrong Flooring Guaranteed Installations Systems manual, F-5061 for a complete guide on project conditions.

B. Existing Conditions: Concrete on grade.

C. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.08 SEQUENCING AND SCHEDULING

A. Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.

B. Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.

1.09 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.10 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.

1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.

2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.01 RESILIENT LINOLEUM SHEET FLOORING

A. Approved Manufacturer:

1. Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17604, www.armstrongflooring.com/commercial
2. Manufacturer must have a headquarters in the United States of America
3. All others must submit for approval

B. Product: Striations BBT™ with Diamond 10 Technology Coating Migrations® BBT™ with Diamond 10 Technology Coating Bio-Flooring manufactured by Armstrong Flooring, Inc.

1. Description: Tile composed of polyester resin binder, fillers and pigments with colors and pattern dispersed uniformly throughout its thickness protected by a diamond-infused UV-cured polyurethane finish.
2. Bio-flooring tile shall conform to the requirements of ASTM F 2982 Standard Specification for Polyester Composition Floor Tile. Note: Striations BBT™ with Diamond 10 Technology Coating and Migrations® BBT™ with Diamond 10 Technology Coating Bio-flooring's unique binder system does not contain polyvinyl chloride resins and plasticizers
3. Pattern and Color: See Architectural Construction Documents
4. Size: 12in x 24in.
5. Thickness: 1/8”/0.125in (3.2mm)
6. Width: 79" (2 Meters).
7. Length: 105 Linear Feet (32 Meters).
8. Adhesive: Per manufacturers recommendations.
9. Heat Welding Rod: color-matched welding rod.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions:

1. Substitutions shall be submitted for approval five (5) working days prior to Bid.

2.03 RELATED MATERIALS

A. Related Materials: Refer to other sections for related materials as follows:

1. Underlayment and Patching Compound: Refer to Division 03 Concrete Sections for portland cement-based underlayments and patching compounds.
2. Resilient Flooring Accessories: Refer to Division 09 Finishes Sections for resilient flooring accessories.
3. Expansion Joint Covers: Refer to other specification section for expansion joint covers to be used with resilient flooring.

2.04 ADHESIVES

A. For Tile Installation System, Full Spread: Provide ArmstrongS-525 BBT® Bio-Flooring Adhesive under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

1. For Tile High-Moisture Installation Warranty, Full Spread: Provide Armstrong S-525 BBT® Bio-Flooring Adhesive under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
2. Source Quality: Obtain flooring product materials from a single manufacturer.

2.05 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), as required and recommended by Armstrong

B. For creating a moisture barrier, provide S-452 Seal Strong™ two part moisture mitigation system.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

B. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.03 PREPARATION

A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

B. Surface Preparation:

1. General: Prepare floor substrate in accordance with manufacturer's instructions.
2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening compounds, sealers, asphalt and old adhesive residue.
3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with portland cement-based compounds. Do not use or install flooring over gypsum-based leveling or patching materials.
    a. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

C. Concrete Moisture Test: Perform moisture tests on concrete floors regardless of the age or grade level with a minimum of three tests for the first 1000 square feet. The test shall be a calcium chloride test. One test shall be conducted for every 1000 sq. ft. of flooring. The test shall be conducted around the perimeter of the room, at columns and where moisture may be evident. The moisture emission from the concrete shall not exceed 5.0 lbs. per 1000 sq. ft. in 24 hrs. For the most accurate results, the weight of the calcium chloride dish shall be made on the job site at the start and end of each test. A diagram of the area showing the location and results of each test shall be submitted to the architect, general contractor or end user. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected.

1. Subfloor Preparation Moisture Mitigation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, mitigate

moisture and other defects with Armstrong appropriate products as recommended by the flooring manufacturer. Refer to Armstrong Flooring Guaranteed Installation Systems manual, F-5061 and ASTM F 710 Standard Practice for Preparing Concrete Floors

2. For Tile Installation System, Full Spread when using S-700 adhesive perform subfloor moisture testing in accordance with ASTM F 2170, “Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes” or ASTM F 1869,Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, as required per Armstrong’s recommendations and Bond Tests as described in the Armstrong Flooring Guaranteed Installation Systems manual, F-5061, to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80%Oninstallations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

   a. For Tile High-Moisture Installation Warranty when using S-525 Adhesive, perform subfloor moisture testing in accordance with ASTM F 1869,“Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride” and Bond Tests as described in the Armstrong Flooring Guaranteed Installation Systems manual, F-5061, to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 90%. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

E. Wood Subfloor Substrate: Prepare wood subfloor substrate to be rigid, double construction with a one inch minimum thickness, free from harmful movement and have at least 18 inches of well ventilated air space below. Do not install flooring over wooden subfloors built on sleepers over, on or below grade concrete floors.

   1. Refer to Division 6 Carpentry sections for wood subfloor construction.

3.04 INSTALLATION

A. Install flooring in strict accordance with the latest edition of Armstrong Flooring Guaranteed Installation Systems manual, F-5061. Failure to comply may result in voiding the manufacturer’s warranty listed in Section 1.08.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

E. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

F. Installation Techniques:

1. Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.
2. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.
3. Extend flooring into toe spaces, door reveals, closets, and similar openings.
4. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
5. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.
6. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
    a. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.
7. Roll resilient flooring as required by resilient flooring manufacturer.

G. Finish Flooring Patterns: As selected by Architect.

3.05 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Upon Owner's request and with at least 72 hours notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: Required after initial removal of existing flooring to determine if additional work is required prior to new flooring installation.

3.06 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by tile floor manufacturer.
2. Sweep and vacuum floor after installation.
3. Do not wash floor until after time period recommended by tile flooring manufacturer.
4. Damp-mop tile flooring to remove black marks and soil.
5. Perform initial and on-going maintenance according to the latest edition of Armstrong Guaranteed Flooring Installation Systems manual, F-5061.

3.07 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.08 INITIAL MAINTENANCE PROCEDURES

A. General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.

3.09 SCHEDULES AND PRODUCT CRITERIA FORMS

A. Schedules: as per required by contractor.

END OF SECTION 096516

SECTION 096566 – INDOOR RESILIENT ATHLETIC SURFACING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Supply and installation of the indoor resilient multipurpose surfacing

B. References for the correct construction and preparation of concrete slabs to receive resilient flooring.

1.02 SUBMITTALS

A. Product Data:

1. Manufacturer's promotional brochures, specifications and installation instructions

B. Manufacturer Certifications:

1. All "manufacturer" requirements in these specifications must be complied with by the OEM, including warranties, certifications, qualifications, product data, test results, environmental requirements, performance data, etc.

C. Samples:

1. Submit for selection and approval three (3) sets of the indoor resilient multipurpose surfacing, manufacturer's brochures, samples or sample boards of all of the available colors, textures and styles.

D. Closeout Submittals:

1. Submit one (1) copy of the indoor resilient multipurpose surfacing and manufacturer's maintenance instructions.

2. Submit one (1) copy of the material and installation warranties as specified.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. The indoor resilient multipurpose surfacing shall have been actively marketed for a minimum of ten (10) years.

2. The indoor resilient multipurpose surfacing supplier shall be an established firm, experienced in the field, and competent in the techniques required by the manufacturer.

3. The installer of the indoor resilient multipurpose surfacing shall have a minimum of five (5) years of experience in the field installing indoor resilient multipurpose surfacing and have worked on at least five (5) projects of similar size, type and complexity.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to Tarkett Sports / FieldTurf USA, Inc. recommendations.

B. Storage:

1. Store the material in a secure, clean and dry location with a temperature between 55° and 85° Fahrenheit.

2. Store the indoor resilient dance floor surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to jobsite.

3. Rolls shipped in rigid protective cardboard containers can be laid horizontally prior to unpacking and installation.

1.05 PROJECT/SITE CONDITIONS

A. It is the responsibility of the general contractor/construction manager to maintain project/site conditions acceptable for the installation of the indoor resilient multipurpose flooring.

B. The area in which the indoor resilient multipurpose surfacing will be installed shall be dry and weather tight. Permanent heat, light and ventilation shall be installed and operable.

C. All other trades shall have completed their work prior to the installation of the resilient dance floor flooring. The general contractor or construction manager shall maintain a secure and clean working environment before, during and after the installation.

D. Maintain a stable room temperature of at least 65°F for a minimum of one (1) week prior to, during and thereafter installation.

E. An effective low-permeance vapor barrier is placed directly beneath the concrete subfloor. For “on” or “below grade” installations, it is recommended to provide a permanent vapor barrier resistant to long term hydrostatic pressure/moisture exposure. Protrusions should be sealed to prevent moisture migration into the slab. Moisture should not be allowed to enter the slab after the completed construction.

F. Concrete subfloor surface pH level within the 7 to 9 range dependent upon installation type.

G. Concrete subfloor should be no greater than 1/8" within a 10 ft diameter. This tolerance can be measured in accordance with ASTM E1155. A specified (FF) of 50 and an (FL) of 30 should reach this degree of floor flatness and floor level. There is no numerical correlation between F numbers and the deviation from the straight edge. However, the above specified numbers should achieve a flat floor with minimal deviation in the slab. Reference ACI 117 and ACI 302.1R. The general contractor should provide a certificate of compliance with the above recommendations.

H. Concrete subfloor must be clean and free of all foreign materials or objects including, but not limited to, curing compounds and sealers.

I. Fill cracks, grooves, voids, depressions, and other minor imperfections. Follow the manufacturer’s directions. Moveable joints must be treated utilizing specific transitioning joint devices depending upon the architect’s recommendations. Follow current ASTM F710 guidelines for the preparation of concrete slabs to receive resilient flooring.

J. Refer to ACI 302.2R “Guidelines for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials” for concrete design and construction.

K. Concrete slab shall be fortified with continual steel reinforcement. Fiber reinforcement alone shall not be considered adequate fortification.

1.06 WARRANTY

A. Special Limited Warranty:

1. Manufacturer's standard form in which manufacturer agrees to repair or replace sports flooring including labor that fails within specified warranty period.

B. Material warranty must be direct from the product manufacturer.

1. Material warranties must come from original manufacturer or division thereof.

C. Warranty Period:

1. For material defects and surface wear-through: 10 years from date of substantial completion.

2. For moisture vapor tolerance: 10 years from date of substantial completion.

1.07 ADDITIONAL MATERIALS

A. Furnish to the owner additional materials containing a total of 5% or at least one full carton of each different color or design of the indoor resilient dance floor surfacing used on the project.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Prefabricated dance floor surfacing 3.5 mm with slightly textured embossed surface.

1. Intermediate layers shall be fortified with a non-woven fiberglass grid for increased dimensional stability.
2. The foam force reduction layer shall be high-density closed cell PVC foam with honeycomb embossing, and is applied in one continuous manufacturing process.
3. Laminated or adhered foam layers will not be allowed.
4. Field constructed products will not be accepted.

B. Adhesive moisture mitigation combination. Provide non-solvent reactive topically applied moisture mitigation/adhesive according to manufacturer's recommendations.

C. Physical properties of the indoor resilient dance floor surfacing shall conform to the following minimums:

Width	—	6' 6" (2 m)
Length	—	49' (15 m) approx.
Wear Layer	—	2 mm
Total Thickness	—	3.5 mm
Wear Layer	Type 1– Grade 1	ASTM F1303/F410
Force Reduction	PASSED	ASTM F2772 Class 1
Slip Resistance	P3	AS 4586
Surface Finish Effect	PASSED	ASTM F2772 (80 – 110)
Abrasion Volume Loss	Group T: ≤2.0 mm3	EN 660: Part 2
Chemical Resistance	Excellent	ASTM F925
Impact Resistance	PASSED	EN 1717
Abrasion Resistance	PASSED	0.10 (EN ISO 5470-1 {06/1999})
Static Load Limit	PASSED	ASTM F970- Load 175 Lbs
Sound Insulation	Excellent	+/= 19 dB (ISO 717/2)
In-Room Sound Insulation	Excellent	61dB (NF S31-074)
Fire Rating	PASSED	ASTM E648 Class 1
Phthalate-free technology	—	YES
REACH Compliant	—	YES
Heavy Metals	—	NO
ISO 9001	—	YES
ISO 14001	—	YES

1. Color: See Architectural Construction Documents

D. Welding Rod: As supplied by the indoor resilient dance floor surfacing manufacturer or supplier.

1. Color to blend with the indoor resilient dance floor surfacing color or design.
2. All seams shall be welded to create a monolithic and impermeable surface.

E. Adhesive: As approved by the indoor resilient dance floor surfacing manufacturer.

2.02 ACCEPTABLE MANUFACTURERS

A. Tarkett Sports- Tarkett rep: Doug Edwards 317.443.9579

2.03 MATERIALS

A. As indicated on Drawings.

2.04 ACCESSORIES

A. As required per manufacturers recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. It is the responsibility of the general contractor/construction manager to ensure that project/site conditions are acceptable for the installation of the indoor resilient dance floor surfacing.

B. Verify that the area in which the indoor resilient dance floor surfacing will be installed is dry and weather tight. Verify that permanent heat, light and ventilation are installed and operable.

C. Verify that all other work that could cause damage, dirt and dust or interrupt the normal pace of the indoor resilient dance flooring installation is completed or suspended.

D. Verify that there is a stable room temperature of at least 65°F.

E. Verify that there are no foreign materials or objects on the subfloor and that the subfloor is clean and ready for installation.

F. Direct Full Spread Adhering to Concrete Subfloor: moisture content less than 83% RH when tested per ASTM F2170.

G. Follow Tarkett Sports / FieldTurf USA, Inc. installation recommendations.

H. Do not average the results of the tests. Report all field test results in writing to the General Contractor, Architect, and End User prior to installation.

I. Verify that the concrete subfloor surface pH level is within the 7 - 10 range.

J. Document the results confirming the slab is within manufacturer's tolerances for slab deviation.

3.02 PREPARATION OF SURFACES

A. Sand the entire surface of the concrete slab.

B. Sweep the concrete slab so as to remove all dirt and dust. If a sweeping compound is to be used it must be a sweeping compound that does not contain oil or other items that may inhibit the adhesive bond.

C. Slab must be dust free. In the event that dust impairs adhesive bond, priming the slab prior to application of adhesive may be necessary. Follow installation guidelines.

3.03 INSTALLATION

A. The installation area shall be closed to all traffic and activity for a period to be set by the indoor resilient dance floor surfacing installer. The indoor resilient dance floor surfacing installation shall not begin until the installer is familiar with the existing conditions.

B. Install the indoor resilient dance floor surfacing in strict accordance with the indoor resilient dance floor surfacing manufacturer's written instructions.

C. Install the indoor resilient dance floor surfacing minimizing cross seams. Provide a seam diagram during the submittal process for approval prior to installation. Vinyl Sheet Flooring Seams: Comply with ASTM F 1516. Rout joints and heat weld to permanently and seamlessly fuse sections together.

D. Install appropriate threshold plates or transition strips where necessary.

3.04 CLEANING

A. Remove all unused materials, tools, and equipment and dispose of any debris properly. Clean the indoor resilient dance floor surfacing in accordance with the manufacturer's instructions.

3.05 PROTECTION

A. Protect the indoor resilient dance floor surfacing from damage using coverings approved by the manufacturer until acceptance of work by the owner and/or the Architect

3.06 RELATED STANDARDS AND GUIDELINES

A. ASTM F2170 “Standard Test Method for Determining Relative Humidity In Concrete Floor Slabs Using In-Situ Probes”

B. ASTM F710 “Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring”

C. ACI 302.2R-06 “Guideline for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials”

D. ASTM F2772-11 “Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems”

END OF SECTION 096566

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SECTION 096613 – TERRAZZO

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all labor, materials and equipment necessary to install 3/8” epoxy terrazzo floor as required to satisfy the intent of the Contract Documents. Anti-fraction membrane divider strips.

B. Related Work Specified Elsewhere:

1. PRODUCT INFORMATION – TUFF-LITE Epoxy Terrazzo Systems

1.02 INDUSTRY STANDARDS

A. Work of this section shall comply with the specification of the National Terrazzo and Mosaic Association, Inc.

B. All material shall be the product of a manufacturer who is a member of the National Terrazzo and Mosaic Association.

1.03 SUBMITTALS

A. Furnish two 6" x 6" samples of each color pattern to be used in the project to the Architect/Building for approval.

B. Submit shop drawings indicating layout of divider strips, control joint strips and border strips.

PART 2 – PRODUCTS

2.01 GENERAL

A. Floor systems shall be 3/8” epoxy Terrazzo consisting of cementitious terrazzo topping installed over a cement under bed with a sand isolation bed on the concrete slab.

B. Colors, patterns, and border shall match the terrazzo plan in the construction documents.

2.02 MATERIALS

A. Terrazzo shall be of granite, marble, glass or onyx chips or a combination of these materials. No 1 and 2 chips shall be used.

1. Size: To conform with NTMA gradation standards
2. Hardness: To ASTM C241 Ha minimum
3. 24 hour absorption rate not to exceed 0.75%
4. Chips shall contain no deleterious or foreign matter
5. Dust content less than 1% by weight

B. New terrazzo’s aggregate size, and pattern to match existing terrazzo (One main field with one border) and as indicated on the Terrazzo Plan in the Drawings.

C. Portland Cement: ASTM-C-150 type 1, color to match existing or as indicated on the Drawings.

D. Sand: ASTM-C-33, fine aggregates.

E. Strips:

1. Divider strips: 1/8" of material with a depth of 1 1/4", divider strips to match existing in width, profile and finish.

2. Control joint strips: 16 gauge of material with a depth of 1 1/4" with 1/8" black neoprene filler.
3. Anchoring Device: Configuration or attachment shall provide for secure system of anchoring all strips in floor.

F. Colorants: Alkali-resistant non-fading color pigments.

G. Isolation Membrane: 4 mil polyethylene sheeting.

H. Curing Materials: Wet sand, polyethylene sheeting or water.

I. Terrazzo Cleaner:
1. pH factor between 7 and 10.
2. Free from crystallizing salts or water soluble alkaline salts.
3. Biodegradable and phosphate free.

J. Sealer:
1. pH factor between 7 and 10.
2. Shall not discolor or amber.
3. Penetrating type specially prepared for use on terrazzo.
4. Flash point: ASTM D-56, 80 degrees F. minimum.
5. Confirm manufacturer and type with Owner prior to application.

2.03 PROPORTIONS

A. Terrazzo Topping: One 94 pound bag of Portland cement per 200 pounds of marble chips.
1. Charge and mix marble chips, Portland cement (and color pigment if required).
2. Add water and mix to a uniform workable consistency.

B. Underbed: One part Portland cement to four parts sand and sufficient water to provide workability at as low a slump as possible.

PART 3 – EXECUTION

3.01 PREPARATION

A. Inspect all surfaces to receive terrazzo and verify they are in accordance with the recommendations of the National Terrazzo and Mosaic Association, Inc.

3.02 LAYOUT

A. Locate all divider strips control joints and accessories and verify with Architect before starting the work in this section. Top of strips shall be positioned above finish surface to allow for grinding.

3.03 INSTALLATION OF POLISHED TERRAZZO

A. Underbed
1. Thoroughly saturate concrete subfloor with water, slush and broom with neat cement paste.
2. Place concrete underbed.
3. Screed underbed to elevation one half inch below finished floor elevation or slope.
4. Install divider strips as shown on drawings in semi-plastic underbed and trowel firmly along edges to assure positive anchorage.

5. Install control joint strip precisely above expansion joints taking care that control joint strip is full depth of underbed.

B. Placing Terrazzo

1. Saturate underbed with water.
2. Place terrazzo mixture in panel formed by divider strips.
3. Trowel mixture to level of top of strips.
4. Seed troweled surface with additional chips in same proportions as contained in terrazzo mix and trowel.
5. Roll seeded surface with heavy roller until all excess water has been extracted.
6. Trowel to uniform surface disclosing lines of divider strips.

C. Curing:

1. After completing placement of terrazzo, install curing material in accordance with manufacturer's recommendations.
2. Cure topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.

D. Finishing:

1. Rough grinding:
   a. Grind with 24 or finer grit stones or with comparable diamond plates.
   b. Follow initial grind with 80 or finer grit stones.
2. Grouting:
   a. Cleanse floor with clean water and rinse thoroughly.
   b. Remove excess rinse water and machine or hand apply grout using identical Portland cement, color and pigments as used in topping taking care to fill all voids completely.
3. Curing Grout:
   a. As soon as grout has attained initial set install curing material.
   b. Cure grout a minimum of 72 hours unless a cement modifier is used.
   c. Grout may be left on terrazzo until fine grinding which should not be scheduled until all heavy and messy work in project is completed.
4. Fine Grinding:
   a. Grind with 80 or finer grit stones until all grout is removed from surface.
   b. Upon completion terrazzo shall show a minimum of 70% to 75% of marble chips.

E. Cleaning and Sealing

1. Thoroughly wash all surfaces with a neutral cleaner after fine grinding.
2. Rinse with clean water and allow surface to dry thoroughly.
3. Apply sealer in accordance with manufacturer's directions.

F. Protection: Upon completion, the work shall be ready for final inspection. The floor surface shall be protected from damage until terrazzo work has been accepted.

3.04 WORKMANSHIP

A. All workmanship shall be first-class. No allowances will be made for lack of experience or skill in the workman for his work.

B. All the work of this section shall be installed in strict accordance with recommendations and directions of the manufacturer.

END OF SECTION 096613

SECTION 096813 –CARPET SQUARES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Carpet squares with adhesive back.

B. Accessories

1.02 REFERENCES

A. ASTM D2859 - Test method for flammability of finished textile floor covering materials.

B. ASTM E84 - Surface burning characteristics of building materials.

C. ASTM E648 - Critical Radiant flux of floor covering systems using a radiant heat energy source.

D. NFPA 253 - Test for critical radiant flux of floor covering systems.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate seeming plan, method of joining seams, direction of carpet.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation, and layout of flat wire system.

D. Samples: Submit two samples 18 x 18 inch (450 x 450 mm) in size illustrating color and pattern for each carpet material specified.

E. Submit two, 12 inch (300 mm) long samples of edge strip, material for each color specified.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing specified carpet with minimum three years documented experience.

B. Installer: Company specializing in installing carpet with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/smoke rating requirements in accordance with ASTM E84.

B. Conform to NFPA 253, ASTM E648, Class I for flooring radiant panel test.

C. Conform to ASTM D2859 for surface flammability ignition test.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.

B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 3 days prior to, during and 24 hours after installation.

1.07 MAINTENANCE DATA

A. Submit under provisions of Section 017700.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.08 EXTRA MATERIAL

A. Furnish under provisions of Section 017700.

B. Provide 5% extra of carpet squares, but not less than 8, of each type, color, and pattern specified.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – CARPET SQUARES

A. Bentley

B. Shaw Contract

C. Atlas/Masland

2.02 MATERIALS - CARPET

A. Refer to the Room Finish Schedule for Carpet Material for this Project

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. “Pressure Sensitive Adhesive” designed for use with carpet squares

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 ft. (6 mm in 3 m), and are ready to receive work.

B. Verify concrete floors are dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

3.02 PREPARATION

A. Vacuum clean substrate.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Prime any patched areas, dirty, dusty or porous floors with a latex milk additive such as Parachem 615 or 620.

3.03 ADHESIVE APPLICATION

A. Adhesive must be used in a full spread application

B. Apply with a 1/16 x 1/16 x 1/16 square notched trowel. Do not apply with a paint roller.

C. Allow adhesive to dry to a clear and tacky state before laying carpet squares.

3.04 INSTALLATION

A. Install carpet squares per Manufacturer’s instructions.

B. Install tiles immediately after adhesive has dried

C. Lay carpet squares tight and flat on subfloor.

D. Fit carpet squares tight to intersection with vertical surfaces without gaps.

E. Where wall bases are scheduled, cut carpet squares tight to walls.

F. Fit carpet squares tight to vertical surfaces to form base.

G. Carpet squares shall be installed in the configurations noted on the material finish legend.

3.05 CLEANING

A. Clean work under provisions of 017700.

B. Remove excess adhesives without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

END OF SECTION 096813

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SECTION 097513 – WALL TILE

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Ceramic tile wall and base finish using the thinset application method.

1.02 REFERENCES

A. ANSI A108.1 - Installation of Ceramic Tile with Portland Cement Mortar.

B. ANSI A108.3 - Quarry Tile and Paver Tile Installed With Portland Cement Mortar.

C. ANSI A108.4 - Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive.

D. ANSI A118.10 - Installation of Grout in Tilework.

E. ANSI A118.4 - Latex-Portland Cement Mortar.

F. ANSI A118.6 - Ceramic Tile Grouts.

G. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.

H. ANSI A137.1 - Standard Specifications for Ceramic tile.

I. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

C. Product Data: Provide instructions for using adhesives and grouts.

D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements and ANSI A137.1.

1.04 MAINTENANCE DATA

A. Submit under provisions of Section 017700.

B. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI A137.1.

B. Conform to TCA Handbook.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in an unventilated environment.

B. Maintain a minimum of 50 degrees F (10 degrees C) during installation of mortar materials.

1.09 EXTRA MATERALS

A. Furnish under provisions of Section 017700.

B. Provide 5% or at least one full carton/box of each size, color, and surface finish of tile specified.

PART 2 – PRODUCTS

2.01 TILE MANUFACTURERS

A. Unglazed Ceramic Tile: (4”x12”, 12”x12”, 3”x12” - See Material Finish Legend in drawings)

1. Crossville Tile- See Material Finish Legend in drawings
2. Nemo Tile- See Material Finish Legend in drawings
3. Landmark Ceramics- See Material Finish Legend in drawings

2.02 CERAMIC TILE MATERIALS

A. Ceramic Mosaic Wall Tile: ANSI A137.1, per Room Finish Schedule.

B. Wainscot Cap: Match wall tile for moisture absorption, surface finish, and color, bull nosed top edge.

2.03 BASE MATERIALS

A. Base: Match floor tile for moisture absorption, surface finish, and color.

2.04 ADHESIVE MATERIALS

A. Manufacturers: Organic Adhesives, Type I

1. Mapei Corp.
2. American Olean Tile Co., Inc.
3. W.R. Bonsal co.
4. Bostik Construction Products Div.
5. Laticrete International, Inc.

B. Organic Adhesive: ANSI A136.1, Type I for shower, tub and areas subject to high moisture, Type II for other areas, thinset bond type.

C. Epoxy Adhesive: ANSI A118.3, thinset bond type.

D. Tile Setting Adhesive: Elastomeric, waterproof, liquid applied.

2.05 MORTAR MATERIALS

A. Manufacturers: Latex-Emulsion-Based Latex-Portland Cement Mortar.

1. Mapei Corp.
2. American Olean Tile, Co., Inc.
3. W.R. Bonsal Co.
4. Bostik Construction Products Div.
5. Laticrete International, Inc.

B. Mortar Materials: ANSI A118.4 Latex Modified, Portland cement, sand, latex additive, and water.

2.06 GROUT MATERIALS

A. Manufacturers: Acrylic Emulsions for Latex-Portland Cement Grouts.

1. Mapei Corp
2. American Olean Tile Co., Inc.
3. W.R. Bonsal Co.
4. Bostik Construction Products Div.
5. Laticrete International, Inc.
6. Grout: ANSI A118.6, tile grout, color as selected.
7. Color Admixture: Pre-mixed type, color as selected, manufactured by SGS or by manufacturer of tile and mortar materials.

2.07 ACCESSORIES

A. Membrane: No. 15 (6.9 kg) asphalt saturated felt.

2.08 MORTAR MIX AND GROUT MIX

A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions and TCA Handbook.

PART 3 – EXAMINATION

3.01 EXAMINATION

A. Verify substrate.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Protect surrounding work from damage or disfiguration.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Apply sealer or conditioner to substrate surfaces in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - THINSET METHOD

A. Install adhesive tile and grout in accordance with manufacturer's instructions and to TCA Handbook Method Number.

B. Install backing board over metal studs in accordance with board manufacturer's instruction. Tape joints and corners, cover with skim coat of mortar to a feather edge.

C. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.

E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

F. Form internal angles square and external angles bullnosed.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control joints free of adhesive or grout. Apply sealant to joints.

I. Allow tile to set for a minimum of 48 hours prior to grouting.

J. Grout tile joints.

K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 CLEANING

A. Clean work under provisions of 017700.

B. Clean tile and grout surfaces.

3.05 SCHEDULE

A. See Room Finish Schedule.

END OF SECTION 097513

SECTION 099010 – GENERAL PAINTING REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Includes But Not Limited To-

1. Finishing elements of the building shown on attached Finish Schedule or specified below.
2. Back prime work to be installed against concrete or masonry or subjected to moisture.
3. Paint mechanical and electrical items located in classrooms as determined by Owner.

B. Related Documents-

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Section in Division 01, General Requirements, of these Specifications.

1.02 DESCRIPTION OF SYSTEMS:

A. It is the intent of this Specification to require all existing painted wall surfaces, except those explicitly exempted herein, to be painted under this contract.

1.03 SUBMITTALS

A. Product Data-

1. Written list of specific products proposed along with Manufacturer's certification that products meet specified requirements.
    a. Data shall be specific as to Manufacturer's brand name and identifying numbers.
    b. Indicate square footage to be covered by each product, Manufacturer's recommended coverage rates, and amount of product required based on average coverage.
    c. Indicate items to be finished as work of each painting Section.
    d. Outline, preparation and application procedures to be followed including application methods, time between coats, and environment
    e. Provide Manufacturer's cut sheets which indicate paint components. As a minimum, specification requirements for paint composition shall be given on cut sheets submitted.
2. Color selection data.
3. Maintenance instructions.

B. Samples-

1. Provide paint card for each color and for each paint system. Card to show each component of system as well as total system.

1.04 QUALITY ASSURANCE

A. Pre-installation Meeting-

1. Schedule meeting after delivery of paint but prior to application of field samples or paint.

B. Field Samples-

1. Prior to application of any paint system meet on Project site with Owner's representative. Owner may select one surface for application of each paint system specified.

2. Apply paint systems to surfaces indicated following procedures outlined in Contract Documents and Product Data submission specified above.

3. After approval of samples, proceed with application of paint system throughout Project.

C. Applicator shall have experience in application of specified products for five years minimum and be acceptable to Owner and Manufacturer.

1.05 DELIVERY, STORAGE, & HANDLING

A. Deliver specified products in original containers with labels intact on each container. Deliver amount of material indicated on submittal for Project in single shipment. Notify Owner two working days prior to delivery.

B. Store materials in single place.

C. Keep storage area clean and rectify any damage to area at completion of work of this Section.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Conditions-

1. Maintain temperature of paint storage area at 55 deg. F minimum.

2. Perform painting operations at temperature conditions recommended by Manufacturer for each operation.

1.07 SCHEDULING

A. Coordinate by room painting schedules with Owner.

B. Examine Contract Documents for painting requirements of other trades. Become familiar with their painting provisions and the painting of finish surfaces left unfinished by the requirements of other Sections.

C. Contractor may work in facilities during normal hours of 6 a.m. to 6 p.m., or with approval of Owner after 6 p.m.

1.08 MAINTENANCE

A. Extra Materials-

1. Provide one gallon of each finish coat material in Manufacturer's original container in each color used. Provide one gallon of each primer and of each undercoat in each color used.

PART TWO – PRODUCTS

2.01 MATERIALS

A. Linseed oil, shellac, turpentine, and other painting materials shall be pure, of highest quality, and bear identifying labels on containers.

B. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

C. Paint compositions shall not only meet specified requirements but also contain sufficient miscellaneous components to promote proper drying and performance during and after application.

PART THREE – EXECUTION

3.01 INSPECTION

A. Prior to installation of work of this Section, inspect classrooms to verify that space is ready for commencing painting.

B. If inspection reveals deficiencies in work areas such that painting cannot be successfully completed, for not proceed with work of this Section in area of deficiency until resolved.

C. Starting painting work will be construed as acceptance of surfaces and conditions within any particular area.

3.02 PREPERATION

A. Protection-

1. Remove all oily rags and waste from building each night. Take every precaution to avoid danger of fire.

2. Protect finish work and adjacent materials during painting.

3. Good painting practice excludes splattering, dripping or painting any surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following-

a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.

b. Keep cones of ceiling speakers completely free of paint. If it is required that metal speaker grilles are to be painted, paint prior to mounting grilles to speakers. Mask of metal grilles installed on ceiling speakers if ceiling is being spray painted.

B. General Surface Preparation-

1. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.

2. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting.

3. Apply barrier coats over incompatible primers.

4. Remove hardware, electrical device covers, lighting fixtures, and similar in place work or provide surface applied protection prior to surface preparation and painting. After completion of painting, reinstall any removed work.

5. Fill holes and cracks in surfaces to receive paint or stain.

C. Metal Surfaces-

1. Wash metal surfaces with mineral spirits to remove dirt and grease before applying materials.

2. Where rust or scale is present, use wire brush or sandpaper to clean before painting.

3. Clean shop coats of paint that have become marred and touch up with proper type primer.

4. Treat galvanized metal and zinc surfaces as specified and in accordance with Manufacturer's directions before applying first paint coat.

D. Wood Surfaces-

1. Sand woodwork smooth with 220 sandpaper and clean surfaces before proceeding with stain or first coat application.

2. Use fine sandpaper between coats to produce smooth, even surfaces.

E. Cementitious & Masonry Surfaces-

1. Clean to remove efflorescence, chalk, dust, dirt, grease, oils, and the like.

2. Roughen where required to remove glaze.

3. Clean concrete floors with etching cleaner and flush with clean water.
4. Pay particular attention to the paint manufacturer's preparation instructions.
5. Except for steam cured products, allow surfaces to cure from 30 to 90 days according to manufacturer's recommendations before painting.

3.03 APPLICATION

A. Carefully follow Specifications and color schedule, painting complete all surfaces to be painted.

B. Spread materials smoothly and evenly.

C. Putty nail holes in wood after application of first finish coat using natural colored type to match wood finish. Bring putty flush with adjoining surfaces.

D. Finished work shall be uniform, of approved color, smooth, and free from runs, sags, defective brushing, rolling, clogging, and excessive flooding.

E. Read color schedule for rooms before priming walls. Tint priming coat and undercoat to approximate shade of final coat, but with enough difference so it is possible to check application of specified number of coats.

F. Touch up suction spots after application of first coat.

G. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.

I. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.

3.04 ADJUSTMENT

A. At completion of Project, touch up work to match specified finish. Repaint are damaged during construction with specified finish at no additional cost to Owner.

3.05 CLEANING

A. Do not discard paint containers without Owner's written approval to allow count to determine if paint delivered was applied.

B. Upon completion of work of this Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of this Section from premises.

END OF SECTION 099010

SECTION 099123 – PAINTING AND FINISHING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included:

1. The type of material to be used and the number of coats to be applied are listed in the Part 2 of this Section or as noted on the Drawings.
2. Prepare and paint or finish surfaces as hereinafter described, including, but not limited to the following:
   a. Concrete Unit Masonry
   b. Gypsum plaster
   c. Cement plaster
   d. Wood doors, finish wood carpentry, and trim
   e. Hollow metal doors, frames

B. Other exposed surfaces that are not specifically indicated to be factory finished or finished by others.

1.02 JOB CONDITIONS

A. Temperature Restrictions: Do not paint or finish in damp, rainy weather or when ambient temperature is below 50 degrees F.

1.03 QUALITY ASSURANCE

A. Qualifications of Painters: Use only qualified journeymen painters for the mixing and application of paint on exposed surfaces; in the acceptance or rejection of installed painting, no allowance will be made for lack of skill on the part of the painters.

1.04 SUBMITTALS

A. Materials list:

1. Before any paint materials are delivered to the job site, submit to the Architect in accordance with the provisions of Section 01320 of these specifications a complete list of all materials proposed to be furnished and installed under this portion of the work.
2. This shall in no way be construed as permitting substitution of materials for those specified or approved for this work by the Architect.

C. Samples: Accompanying the materials list, submit to the Architect two copies of the full range colors available in each of the proposed products.

1.05 PRODUCT HANDLING

A. Delivery: Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.

B. Protection:

1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste. Comply with health and fire regulations.

3. Use all means necessary to protect paint materials before, during, and after application and to protect the installed work and materials of all other trades.

D. Replacements: In the event of damage to any existing surfaces, items or materials in and/or the property, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Manufacturer

1. All paint materials selected for coating systems for each type of surface shall be the product of a single manufacturer.
2. Primers shall be by the same manufacturer as the paint used for the final coats and shall be of the type recommended by that manufacturer for the particular application.
3. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

B. Standards:

1. Sherwin-Williams
2. M.A.B.
3. Porter Paint
4. Devoe Paint

2.02 GUIDE TO APPROVED PRODUCTS

A. General: The following list of manufacturers and products is approved by the Architect for use on the project. Such a list shall serve as a guide to the quality of the types of materials to be used and shall not be construed as a basis for limiting competition.

B. Materials list:

1. Metal Primer:
   a. Sherwin-Williams - Kemk Kromik Metal Primer
2. Metal Finish coat:
   a. Sherwin-Williams - Pro-Mar Alkyd
3. Latex Wall and Ceiling Primer:
   a. Sherwin-Williams - Pro-Mar Latex Wall Primer
4. Semi-Gloss Finish:
   a. Sherwin-Williams - Style Perfect Latex Semi-Gloss Enamel
5. Flat Finish:
   a. Sherwin-Williams - Pro-Mar 400 Latex Wall
6. Wood Varnish:
   a. Sherwin-Williams - S-W Oil Base Gloss Varnish
   b. Sherwin-Williams - S-W Oil Base Satin Finish
7. Wood Stain Interior:
   a. Sherwin-Williams - S-W Interior Wood Stain
8. Paste Filler:

a. Sherwin-Williams - S-W Paste Wood Filler

9. Galvanized Metal Primer:
   a. Sherwin-Williams - S-W Galvanized Iron Primer
10. Galvanized Metal Finish Coat:
   a. Sherwin-Williams - Pro-Mar Alkyd Semi-Gloss Enamel

C. Finish color as Scheduled or selected by Owner

PART 3 – EXECUTION

2.01 SURFACE CONDITIONS

A. Inspection:
   1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
   2. Verify that paint finishes may be applied in strict accordance with all pertinent codes and regulations and the requirements of these specifications is complete to the point where this installation may properly commence.

B. Discrepancies:
   1. In the event of discrepancy, immediately notify the Architect.
   2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION OF SURFACES, GENERAL

A. Protection: Prior to all surface preparation and painting operations, completely mask, remove, or otherwise adequately protect all hardware, accessories, machined surfaces, nameplates, U.L. labels lighting fixtures, and similar items in contact with painted surfaces but not scheduled to receive paint.

B. Smoothing: Unless specifically noted to be left rough, smooth all finished wood surfaces exposed to view, using the proper sandpaper.

C. Dryness: Unless specifically approved by the Architect, do not proceed with the painting of wood surfaces until the moisture content of the wood is 12% or less.

3.03 PREPARATION OF METAL SURFACES

A. Galvanized Metal:
   1. Clean all surfaces thoroughly with solvent until they are completely free from dirt, oil, and grease.
   2. Thoroughly treat the cleaned surface with phosphoric acid etch.
   3. Remove all excess etching solution and allow to dry completely before application of paint.

B. Other Metals:
   1. Thoroughly clean all surfaces until they are completely free from rust, dirt, oil, and grease.
   2. Allow to dry thoroughly before application of paint.

3.04 PREPARATION OF GYPSUM DRYWALL

A. Remove dirt, dust, and other foreign matter. Smooth all apparent deposits of spackling compound, taking care not to damage the paper cover of the gypsum drywall.

3.05 PREPARATION OF WOOD SURFACES

A. Cleaning: Clean all wood surfaces until they are free from dirt, oil, and all other foreign substance.

B. Knots:
   1. On small, dry, seasoned knots, thoroughly scrape and clean the surface and apply one coat of good quality knot-sealer before application of the priming coat.
   2. On large, open, unseasoned knots, scrape off all pitch and thoroughly clean the area, followed by an application of one coat of good quality knot-sealer.
   3. Remove and treat all pitch surface as required for large knots.

C. Dryness: Unless specifically approved by the Architect, do not proceed with the painting of wood surfaces until the moisture content of the wood is 12% or less.

3.06 PREPARATION OF MASONRY SURFACES

A. Cleaning: Cleaning all masonry surfaces until they are free from dirt, oil, and all other foreign substances.

B. Spot prime existing masonry as required for complete coating.

3.07 PAINT APPLICATION

A. General:
   1. Paint all surfaces except glass, and similar items not finished and not called out for as unfinished.
   2. Paint all grilles and other pre-finished items where the factory finish is not in accordance with the "Painting Schedule".
   3. All painting of mechanical piping shall be by the Mechanical Prime Contractor.

B. Drying:
   1. Allow sufficient drying time between coats.
   2. Modify the periods as recommended by the material manufacturer to suit adverse weather conditions.
   3. Oil-base and oleo-resinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Environmental Conditions:
   1. Comply with the Manufacturers recommendations as to environmental conditions under which the coating systems may be applied.
   2. Do not apply paint in areas where dust is being generated.

D. Moisture Content:
   1. Use a moisture meter approved by the Architect to test surfaces.
   2. Do not apply the initial coating until moisture meter reading is within limits recommended by the paint materials manufacturer.

E. Defects: Sand and dust between coats to remove all defects visible to the unaided eye from a distance of five feet.

F. Color of undercoats: Slightly vary the color of succeeding coats.

3.08 INSPECTION

A. General: Do not apply additional coat until completed coat has been inspected and approved by the Architect.

B. Number of coats: Only inspected and approved coats of paint will be considered in determining the number of coats applied.

3.09 CLEANING UP

A. General:

1. During progress of the work, do not allow the accumulation of empty containers or other excess items except in areas specifically set aside for that purpose.

2. Prevent accidental spilling of paint materials and, in event of such spill, immediately remove all spilled material and the waste or other equipment used to clean up the spill, and wash the surfaces to their original undamaged condition, all at no additional cost to the Owner.

B. Prior to final inspection: Upon completion of this portion of the work, visually inspect all surfaces and remove all paint and traces of paint from surfaces not scheduled to be painted.

3.10 EXTRA MATERIAL

A. Provide the Owner with a minimum of one gallon of each color of paint utilized for their use in maintenance work.

B. The paint containers shall be clearly identified with the paint color number and name.

END OF SECTION 099113

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SECTION 101116 – CHALKBOARDS, MULTI-MEDIA BOARDS, TACKBOARDS AND LITERATURE RACKS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Includes But Not Limited To

1. Chalkboards Whiteboards, Tackboards, Literature Racks and specified hardware.

B. Related Documents-

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.

1.02 SUBMITTALS

A. Submit

1. Manufacturer’s literature or cut sheet
2. Maintenance Instructions
3. Color selections

B. Quality Control Submittals-

1. Submit Manufacturer’s written installation instructions.

1.03 WARRANTY

A. Manufacturer’s standard five-year warranty against faulty workmanship and materials.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers

1. Ghent manufacturing Inc, Lebanon, OH
2. Claridge, Palatine, IL

2.02 COMPONENTS

A. Chalkboards

1. Slate high pressure laminated to ¼” hardboard backing
2. Aluminum frame with full length chalk tray
3. Color to be green or black as selected by Architect
4. Contractor to provide all necessary blocking as required, at no additional cost to Owner.

B. Multi-Media Board

1. Face shall be steel, 28 gauge minimum, coated two sides with fused ground coat, and finished one side with vitreous porcelain enamel designed for use with chalk, dry marker, and as projection screen. Coating shall meet requirements of PEI-S-104.
2. Core shall be mat-formed particleboard.
    a. 3/8 inch thick medium density or 1/2 inch thick low-density minimum.

3. Backing shall be 0.005 minimum aluminum foil.
4. Color – White
5. Contractor to provide all necessary blocking as required, at no additional cost to Owner.

C. Tackboard

1. 1/4 inch natural cork faced with 20 oz cloth supported vinyl meeting requirement of Fed Spec CCC-W-408 Type 2 and UL rated for 25 flame spread minimum.
2. Color as selected by Owner.
3. Backing – C-D grade plugged and touch sanded plywood or particleboard, back primed.
4. Contractor to provide all necessary blocking as required, at no additional cost to Owner.

D. Trim

1. Extruded aluminum with satin etched and anodized finish 6063-T5 Alloy.
   a. Extrusions shall match thickness of units without wedging
   b. Color as selected by Owner
   c. Round all sharp edges
   d. Omit chalktray on units mounted in Corridors
2. Contractor to provide all necessary blocking as required, at no additional cost to Owner.

2.03 LITERATURE RACK

A. Standard:

1. 660 Series Wall Literature Rack as manufactured by Peter Pepper Products, Inc. with local representation by Bodkins and Associates, Inc., phone (616) 949-8845.
2. Modules to be placed in a horizontal arrangement.
3. Contractor to provide all necessary blocking as required, at no additional cost to Owner.

PART 3 – EXECUTION

3.01 FABRICATION

A. Prefabricate units at factory and ship to jobsite in one piece complete with mounting attachments suitable for wall conditions. Units shall be of first quality and lamination done by approved standards of industry. Furnish printed cleaning instructions with each shipment. Chalktrays may be removed for shipment.

3.02 INSTALLATION

A. Mount boards square and level.

B. Mount boards flush to wall top and sill clips, by continuous concealed hangers at top and bottom, or by combination of hangers and clips. Where clips are used, use two top clips minimum per board. Use two bottom clips per board on boards 5 feet long or shorter, three bottom clips on boards over 5 feet long.

C. Use one inch long minimum filler plugs in masonry walls.

D. Apply permanently attached end cap.

END OF SECTION 101116

SECTION 101423 – SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Plaque signs for room/door identification.
2. Provide one (1) sign for each hinged door.
3. Provide pictograph signs at restroom doors.
4. Garage directional signs.

1.02 QUALITY ASSURANCE

A. Conform to handbook RE-4 requirements Standards for Facility Accessibility by the Physically Handicapped.

1.03 SUBMITTALS

A. Shop Drawings and Product Data

B. Provide Contractor with mounting template, if required.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. ASI Sign Systems

B. Others as approved equal.

2.02 MATERIALS

A. POLYMER PLAQUE SIGNS

1. Size:
   a. 6" wide x 4" high, 1/8” thick - text and Braille
   b. 6" wide x 8" high, 1/8” thick - pictograph
2. Border Style: Unframed
3. Surface Texture: Smooth
4. Mounting: Surface
5. Images:
   a. Helvetica Medium, 3/4” high, all uppercase, raised 1/32"
   b. Pictographs, 4" high, raised 1/32" Grade II Braille, 3/8" high, raised 1/32"
6. Background color: To be selected from manufacturer’s standard colors.
7. Text or Logo color: White
8. Finish And Contrast: The Characters and the background of signs shall be matte, or other non-glare finish. Characters and symbols shall contrast with their background - light characters on a dark background.
9. Raised and Brailled Characters (Pictorial Symbol Signs): Letters and numerals shall be raised 1/32", upper case, Helvetica Medium and shall be accompanied with grade 2 Braille.

Pictograms shall be accompanied by the equivalent verbal description (with Braille) placed directly below the pictogram. The border dimension of the pictogram shall be 6" x 6". The border dimension of the verbal description shall be 6" x 2".

B. CHARACTER PROPORTION

1. Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install and clean in strict accordance with manufacturer's recommendations.

B. Use standard hardware and adhesive as furnished by manufacturer.

C. Wall-Mounted Plaque Signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

2. Silicone-Adhesive Mounting: use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

3. Mounting Location And Height: Mounting height shall be 45" above the finished floor to the bottom of the sign, centered within the width of the door.

D. Final installation shall be straight, level, and true to line.

END OF SECTION 101423

SECTION 102113 – METAL TOILET COMPARTMENTS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Metal toilet compartments, floor mounted.

B. Urinal screens: wall mounted

C. Shower Cubicles.

1.02 REFERENCES

A. ANSI A117.1 - Safety Standards for the Handicapped.

B. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A424 - Steel Sheet for Porcelain Enameling.

D. ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

E. FS RR-P-1352 - Partitions, Toilet Complete.

F. Americans with Disabilities Act.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall, floor, and ceiling supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, illustrating panel finish, color, and sheen.

1.04 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 Americans with Disabilities Act for access for the handicapped.

1.05 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.06 COORDINATION

A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Global Steel Products Corporation Product Embassy.

B. Accurate Partitions Corporation Product Concord.

C. Flush Metal Partition Corporation Product Flushlite.

D. Metpar Corporation Product Corinthian.

E. Sanymetal Product Academy.

2.02 MATERIALS

A. As indicated on Drawings.

2.03 ACCESSORIES

A. Pilaster Shoe: Formed ASTM A167 type 304 stainless steel with No. 4 finish, 3inch (175 mm) high, with adjustable screw jack.

B. Head Rails: Hollow stainless steel tube, 1 x 1-5/8 inch (25 x 41 mm) size, with anti-grip strips and cast socket wall brackets.

C. Attachments, Screws, and Bolts; Stainless steel; tamper proof type, heavy duty extruded aluminum brackets.

D. Hardware: Chrome plated non-ferrous cast metal: stainless steel

1. Pivot hinges, gravity type, adjustable for door close positioning.
2. Nylon bearings.
3. Thumb turn door latch with exterior emergency access feature.
4. Door strike and keeper with rubber bumper.
5. Coat hook with rubber bumper.
6. Door pull for outswinging doors.

2.04 FABRICATION

A. Fabricate partitions in accordance with FS RR-P-1352.

B. Fabricate components of steel sheet as follows:

1. Panel and Door Faces: 20 and 22 gage.
2. Pilaster Faces: 18 and 20 gage.
3. Reinforcement: 12 gage (2.5 mm).

C. Doors and Panels:

1. Thickness: 1 inch (25 mm)
2. Door Width: 24 inch (610 mm)
3. Door Width for Handicapped Use: 36 inch (915 mm), out-swinging.
4. Height: 58 inch (1473 mm)

D. Pilasters: 1-1/4 inch (32 mm) thick, of sizes required to suit cubicle width and spacing.

E. Door, Panel, and Pilaster Construction: Sheet steel face, pressure bonded to sound deadening core, form and close edges, miter and weld corners, grind smooth.

F. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

2.05 FINISHING

A. Clean, degrease, and neutralize panels. Follow immediately with a phosphatizing treatment, prime coat and powder coat finish.

B. Single Color: Color as selected by the Architect from standard Manufacturer’s color chart.

C. Stainless Steel Surfaces: No. 4 finish.

D. Exposed Steel Surfaces: Polished chrome plated.

E. Aluminum: Anodized to color as selected.

F. Non-ferrous Surfaces: Polished chrome plated.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch (9 to 13 mm) space between wall and panels and between wall and panels and between wall and end pilasters.

C. Attached panel brackets securely to walls using anchor devices.

D. Attached panels and pilasters to brackets with tamper proof through bolts and nuts. Locate head rails joints at pilaster center lines.

E. Install 30 inch (760 mm) wide x 42 inch (1066 mm) high stainless steel protective splash panels on partitions adjacent to urinals. Fasten with stainless steel screws spaced 8 inches (20 mm) oc.

F. Anchor urinal screen panels to walls with two panel brackets and vertical upright consisting of pilaster. Conceal floor fastenings with pilaster shoes.

G. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.

H. Support pilasters from built-in framing using two adjustable hanging studs providing vertical leveling. Conceal ceiling fastenings with pilaster shoe.

I. Equip each door with two hinges, one door latch, one coat hook and bumper; outswinging door latch.

J. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.

K. Field touch-up of scratches or damaged enamel finish will not be permitted.

L. Replace damaged or scratched materials with new materials.

3.03 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch (6 mm)

B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.04 ADJUSTING

A. Adjust work under provisions of Section 017700.

B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

C. Adjust hinges to position doors in full closed position when unlatched. Return out swinging doors to closed position.

D. Adjust adjacent components for consistency of line or plane.

END OF SECTION 102113

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SECTION 102813 – TOILET ACCESSORIES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Furnish and install accessories where shown on the Drawings and specified herein. Work of this Section includes prefabricated framed mirrors up to and including units measuring 4'-0" wide x 6'-0" high. Fully review Drawings to confirm items located in restrooms and other areas.

1.02 SUBMITTALS

A. Submit product literature to the Architect for approval in accordance with Section 013200 of these specifications.

1.03 PRODUCT HANDLING

A. Packaging:
   1. Furnish all accessories and concealed mounting devices with each unit clearly marked or numbered in accordance with the schedule.
   2. Pack each item complete with all necessary pieces of fasteners.
   3. Properly wrap and cushion each item to prevent scratches during delivery and storage.

B. Delivery, Storage and Handling:
   1. Deliver all accessories to the installers in a timely manner to ensure orderly progress of the total work.
   2. Deliver items in manufacturer's original unopened protective packaging.
   3. Store materials in original protective packaging to prevent physical damage, or wetting.
   4. Handle, so as to, prevent damage to finished surfaces.
   5. Maintain protective covers on all units until installation is complete. Remove covers at final clean-up of installation.

C. Coordination:
   1. Provide all information as requested by other trades so that they may provide cutouts and blocking that occur in their work for the installation of the accessories.

PART 2 – PRODUCTS

2.01 ACCESSORIES

A. Accessory items listed hereinafter are intended to be manufacturer's current standard catalog items of institutional design and construction and are scheduled on the drawings as enumerated herein:

   1. Prefabricated, Framed Mirrors (see construction drawings for more information)
      a. Manufacturer: Bobrick Washroom Equipment, Inc. or approved equal.
      b. Model: B-290 (See drawings for mirror size)
      c. Material: No. 1 quality 1/4" polished plate glass mirror with stainless steel channel frame. Concealed hangers for frame.
      d. Finish: Bright polished (frame)
   2. Grab Bars- 42” grab bars
      a. Manufacturer: Bobrick Washroom Equipment, Inc. or approved equal.
      b. Model: B-5806 x 42"
      c. Material: Type 304, 18 gauge, Stainless Steel

d. Finish: Satin

d. Every stall sized for accessibility by the disabled shall be provided with grab bars in compliance with A.D.A. Title III Design Guidelines.

3. Grab Bars- 36” grab bars
   a. Manufacturer: Bobrick Washroom Equipment, Inc. or approved equal.
   b. Model: B-5806 x 36"
   c. Material: Type 304, 18 gauge, Stainless Steel
   e. Finish: Satin
   d. Every stall sized for accessibility by the disabled shall be provided with grab bars in compliance with A.D.A. Title III Design Guidelines.
4. Grab Bars- 18” grab bars
   a. Manufacturer: Bobrick Washroom Equipment, Inc. or approved equal.
   b. Model: B-5806 x 18"
   c. Material: Type 304, 18 gauge, Stainless Steel
   f. Finish: Satin
   d. Every stall sized for accessibility by the disabled shall be provided with grab bars in compliance with A.D.A. Title III Design Guidelines.
5. Sanitary Napkin-Tampon Disposal: Provide Disposal Unit for every Women's stall
   a. Manufacturer: Rubbermaid (no substitutions ISU Standard)
   b. Model: 6140
   c. Material: plastic
   d. Color: white
6. Waste Receptacle (verify use on this Project):
   a. Manufacturer: Impact Products (no substitution ISU Standard).
   b. Model: 7703 (41 quart)
   c. Material: plastic
   d. Color: grey
7. Toilet Paper Holders
   a. Twin Roll Jumbo (2-9” Jumbo):
      1. Manufacturer: Prime Source (no substitution ISU Standard).
      2. Model: #34017742100
      3. Color: Translucent Black
   b. Single Roll Jumbo (1-9” Jumbo)
      1. Manufacturer: Spring Grove (no substitution ISU Standard).
      2. Model: #330SPG442789
      3. Color: Translucent Black
8. Paper Towel Dispenser
   a. Manufacturer: Scott (no other substitution ISU Standard).
   b. Model: #46253-00
   c. Color: Smoke Plastic
   d. Supplier – Staples

9. Foam Soap Dispenser
    a. Manufacturer: GoJo (no substitution ISU Standard)
    b. Model: 957836 (Staples #) Foam hand soap
    c. Color: ADX12 Chrome/Black Plastic
    d. Supplier – Staples

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that accessories may be installed in accordance with the original design, all pertinent codes and regulations, and the referenced standards.
3. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect/Owner.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. Anchor all accessories rigidly and securely in place so that accessories are level, plumb, and true-to-line. Fit tightly to surfaces to which they are attached. Use mounting techniques in accordance with the appropriate manufacturer's instruction. Conceal anchorage wherever possible.

B. Install manufacturers recommended anchor system for all grab bars.

C. Conceal evidence of drilling, cutting and fitting on adjacent finishes.

D. Fit flanges of accessories snug to wall surfaces. Provide for caulking in gaps between 90 degree return flanges and finish wall surface after accessories are installed.

3.03 COMPLETION OF WORK

A. Repair or remove and replace all defective or damaged materials and equipment to the satisfaction of the Architect and at no additional cost to the Owner.

B. Adjust accessories for proper operation.

C. Clean and polish exposed surfaces prior to final inspection.

D. Deliver accessories schedule, keys and parts manual as part of project close-out documents. For Owner's permanent records, provide two sets of the following items of manufacturer's literature:

1. Technical data sheets of each item used for the project.
2. Service and parts manuals.
3. John Robinson, William Baker and Associates (317)253-5248 to be contacted in the event of need of field service consultation.

END OF SECTION 102813

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SECTION 104413 – FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Fire extinguisher cabinets.
2. Fire extinguisher identification signs.
3. Fire extinguisher

B. Related Sections include the following:

1. Division 7 Section “Caulking and Sealants”
2. Division 7 Section “Firestopping”

1.02 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.04 COORDINATION

A. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 – PRODUCTS

2.01 FIRE EXTINGUISHER CABINET

A. Manufacturer: J. L. Industries

1. Model Number: Academy
2. Installation: Full Recessed
3. Interior Material: 20 gauge, cold-rolled steel – Provide rated box if required to maintain wall fire rating
4. Interior Size: 24"H x 9 ½"W x 6"D
5. Interior Finish: White baked enamel
6. Door Type: Vertical Duo
7. Door and Trim Material: Stainless Steel #304
8. Door and Trim Finish: #4
9. Lettering: Red vertical die cut lettering
10. Glass: Break glass (Laminated Safety Glass)

11. Hardware: Manufacturer’s Standard

B. Or approved Equal

2.02 IDENTIFICATION

A. Identify fire extinguishers with the words "FIRE EXTINGUISHER" in red letters on a white background metal sign, both sides, bracket mounted perpendicular to wall surface above the extinguisher.

B. Lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by Architect.

2.03 FIRE EXTINGUISHERS

A. Fire Extinguisher Manufacturer and Type

1. Buckeye – no substitutions campus standard
2. Dry Chemical
3. 5lb
4. Type A B C

PART 3 – EXECUTION

3.01 INSTALLATION

A. General - Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulation of governing authorities.

B. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

C. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

END OF SECTION 104413

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Welded corridor lockers.

1.03 REINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker

B. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.

2. Show locker trim and accessories.

3. Include locker identification system and numbering sequence.

C. Samples: For each color specified, in manufacturer's standard size.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

E. Samples for Verification: For the following products, in manufacturer's standard size:

1. Lockers and equipment.

F. Product Schedule: For lockers

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. The following metal locker hardware items equal to 5 percent of amount installed for each type and finish installed, but no fewer than five units:

a. Locks.

b. Blank identification plates.

c. Hooks.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver combination control charts to Owner by registered mail or overnight package service. Owners delivery location to be determined.

1.09 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.

b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.

3. Warranty Period for Welded Metal Lockers: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.

1. Obtain locks from single lock manufacturer.

2. Basis of Design: American Locker – Personal Lockers Style 1224 Standard Line - Finish to be stainless steel- to be assembled three (3) high- See architectural drawings for further information.

3. Basis of Design: American Locker – Personal Lockers Style 1224 Custom Line - Finish to be stainless steel- to be assembled three (3) high- See architectural drawings for further information.

2.02 WELDED CORRIDOR LOCKERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASI Storage Solutions; ASI Group.

2. Penco Products, Inc.

B. Doors: One piece; fabricated from 16 gauge steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
2. Door Style: Unperforated panel
    a. Security Vents: Manufacturer's standard, stamped horizontal or vertical.

C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Sides: 16 gauge.
2. Backs: 16 gauge.
3. Shelves20 gauge, with double bend at front and single bend at sides and back.

D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees
1. Continuous Hinges: Manufacturer's standard, steel, full height.
2. Hinges: Manufacturer's standard, steel, continuous type.
3. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.
    a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
    b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

F. Door Handle and Latch for Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

G. Locks: Combination padlocks

H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

I. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.

J. Continuous Sloping Tops: Fabricated from 16 gauge steel sheet, with a pitch of approximately 20 degrees.
1. Closures: Vertical end type.

K. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

L. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

M. Materials:
1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

N. Finish: stainless steel.

2.03 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.

2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.

2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

H. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.04 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.

2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.

2. Anchor single rows of metal lockers to walls near top of lockers and to floor.

3. Anchor back-to-back metal lockers to floor.

B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.

C. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.

D. Equipment:

1. Attach hooks with at least two fasteners.

2. Attach door locks on doors using security-type fasteners.

3. Identification Plates: Identify metal lockers with identification indicated on Drawings.

a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

E. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.

2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.

3. Attach sloping-top units to metal lockers, with closures at exposed ends.

4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.

3.03 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.04 PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

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SECTION 116133 – RIGGING SYSTEMS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. GOVERNING CLAUSE

1. For the sake of brevity, these specifications shall omit phrases such as "Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish and install such materials and perform such operations completely to the satisfaction of the owner’s representative.

C. SCOPE OF WORK

1. One company shall be responsible for the installation of all aspects of the stage rigging equipment. Work under this section shall include furnishing all labor, materials, tools, transportation services, supervision, etc., necessary to complete installation of the stage rigging equipment as well as any other items as herein listed, all as described in these specifications, as illustrated on the accompanying drawings; or as directed by the Owner’s Representative. Work includes the following:

    a. Motorized Rigging

D. SUBSTITUTIONS:

1. Specific items of equipment are specified by trade names. It has been determined by the systems designer that these are the particular items desired by the Owner and establish a standard of quality, equipment function and/or process. It is not the purpose or intent of these documents to eliminate competitive bids. In order to allow proper and fair comparison of pricing, contractors are required to submit their base bid price on the specified equipment. A contractor may submit an alternate bid based on equipment different from that specified only if that Contractor has received prior approval in writing from the Architect at least 10 days prior to bid. Accompanying each request shall be a letter specifically detailing each substitution including catalog data, specifications, operative samples, technical information, drawings, performance and test data, and complete descriptive and functional information to assist in a fair evaluation. Failure to submit any substitution for prior approval or not providing sufficient data for evaluation shall require the exact item specified to be furnished. Architect's approval of a substitution for bid purposes will not relieve the contractor from the responsibility of meeting all specification criteria. If an approval of a substitution is granted, the Contractor shall be fully responsible for any and all changes (wiring, power, distribution, support structure, etc.) such substitution shall require.

E. DEFECTIVE OR NON-APPROVED MATERIALS

1. Should any equipment be found defective, not meeting specifications, or that which has not been approved in writing by the Architect shall, upon discovery (including any time within the period of the guarantee), be replaced with the specified equipment or material at no additional cost.

F. GUARANTEE

1. The Contractor shall guarantee all of the work that is performed under this contract, including all materials, and workmanship, for a period of three (3) years from the date of full acceptance of the work in accordance with the following conditions.
2. Warranty shall be in effect on materials and equipment for three years from the date of system commissioning under the following conditions:
    a. Maintaining the warranty in effect requires annual inspection of the system by a factory trained and certified contractor. Continuing annual inspection is strongly encouraged.
    b. The three year warranty is contingent upon annual inspection at the end of the first and second years of service. The end user is responsible for making arrangements for each inspection with the contractor identified on the Motor Controller or a factory certified inspector/installer.
    c. In the event annual inspection is not requested and performed at the end of the first or second year of service, the warranty shall become void at the end of that year of service.
    d. Each warranty inspection report must be sent to the factory by the inspecting contractor within 10 days of completing the inspection.
3. Nothing in this guarantee shall cause repair or replacement by the Contractor where negligence, neglect or improper operation by the Owner has caused the failure of any equipment installed under this contract.

G. DISCREPANCIES

1. All equipment shall be sized to fit properly. The exact measurements are the responsibility of the Contractor. If there are discrepancies in the specifications, the Contractor shall ask for a clarification from the Architect. If no clarification is requested, the Architect's judgment shall rule.

H. SYSTEM INTEGRATOR

1. The Contractor may utilize a System Integrator to coordinate and assist in the installation of all aspects of the motorized rigging equipment as specified in this section. This shall include but not be limited to all motorized rigging and miscellaneous equipment. The following companies have prior approval as System Integrator:
    a. Beck Studios, Milford OH
    b. Scenic Solutions, Dayton OH
    c. Vincent Lighting Systems, Erlanger KY
2. In order to be considered as a System Integrator on this project, each Contractor requesting approval must submit to the Architect at least ten (10) days prior to the date of bid opening a letter expressing his intent to bid. This letter shall include a list of at least five (5) projects of similar size and scope completed by this firm within the last five (5) years. Inspection of one completed installation may be requested by the Architect/Engineer's Representative prior to consideration of request to bid. The System Integrator shall have been in business under the same name for five (5) full years preceding the date of this bid doing work similar to the type specified. ETCP certification in theatre rigging is required by the lead installer or project manager of the System Integrator to receive approval to bid. Verification of this certification must be provided to be considered for approval. The decision of the Architect as to the capability of the Bidder to successfully complete and maintain the system based on this pre-qualification information shall be final.

3. Pre-Bid request letter shall include a statement that all major items of equipment shall be bid and supplied as specified, or shall contain details of all proposed substitute equipment for review by the Architect/Engineer's Representative. Substitute equipment items to include specifications, parts numbers, and details of interconnection to proposed system. The decision of the Architect as to the acceptability of substitute equipment shall be final.

4. The System Integrator shall employ only fully trained stage riggers and mechanics, for the erection of the stage equipment. The stage riggers shall be completely familiar with the type of equipment to be installed. A competent job superintendent shall be on the job at all times when work is in progress. The job superintendent must be ETCP certified in theatre rigging. A copy of the certification must be furnished to the General Contractor prior to the start of the installation.

I. ACCEPTABLE EQUIPMENT MANUFACTURERS

1. For the purposes of establishing a standard of quality desired on this project, the rigging hardware products of Electronic Theatre Controls of Middleton, Wisconsin are specified.

2. All other companies must receive prior approval to bid this project. Please refer to the section regarding substitutions.

J. DOCUMENTATION

1. SHOP DRAWINGS: Shop drawings and equipment data sheets shall be submitted to the Architect under general provisions within 45 days after award of the contract. Failure to comply with this 45 day requirement shall be cause for disqualification of the selected Contractor and cancellation of contract without cost to the owner, on the basis that the selected Contractor does not have the ability or intention to comply with the specifications. Approval of submitted equipment shall be obtained prior to equipment purchase or fabrication. If shop drawings are rejected, correct and resubmit in the manner specified. All shop drawing information shall be submitted at the same time; no partial submittal shall be accepted. Drawings shall indicate complete details, dimensions, product types and locations of all equipment, clearances required, guides, cables, sets, Contractor fabricated equipment, and all other details required to completely describe the work to be performed. Submittals drawings shall be presented at a scale not less than 1/4" for equipment layouts and ½" = 1'-0" for equipment details, mounting and other details. Each sheet shall allow space for approval stamps and have the name of the project, the contractors and/or the supplier's name, address telephone number, and the date submitted. Submit the following items for Architect's approval, prior to fabrication:

   a. Stage plan view

   b. Stage side section view

   c. Gridiron layout indicating all stage equipment

   d. Electrical riser diagrams indicating the necessary power and control wiring for all rigging equipment and systems

   e. Plan and elevation views indicating all power, motor and control hardware locations and layout

   f. Provide full dimensions for panel layouts with finishes and materials for all custom panels

   g. Details of installation and erection, including adjoining conditions and necessary clearances

   h. Indication by arrow and boxed caption of each variation from contract drawing and specifications, except those indicated as acceptable in specifications or on drawings

2. RECORD DRAWINGS AND DATA: Submit in accordance with General Provisions. Within 30 days of final test and completion of the installation, submit the following to the Architect:
    a. Three (3) complete sets of "as built and approved" drawings showing systems and elements as installed, including field modifications and adjustments
    b. Three (3) sets of maintenance data including a list indicating replacement parts lists for all items of equipment, wiring diagrams, control diagrams, any and all keys for cabinets, racks, key operated switches etc. and complete operation manuals.
    c. Three (3) Certificates of Guarantee
3. INSTRUCTION OF OWNER PERSONNEL: This contractor or his representative, fully knowledgeable and qualified in systems operation, shall provide four (4) hours of instruction to the Owner-designated personnel on the use and operation of this System. Designated instruction times shall be arranged through the Architect.
4. PERMITS: Obtain all permits necessary for the execution of any work pertaining to the installation, and conform in all trades with all applicable local codes and national codes. Obtain all permits necessary for operation of any equipment by the Owner.
5. CLEAN UP: It shall be the responsibility of this Contractor to remove all debris from the building or site caused by his operations to a common trash point or receptacle on the job site, as determined by the General Contractor.

1.02 RIGGING HOISTS

A. General

1. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights, equipment, curtains and scenic elements, whether used on stage, in the auditorium or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered, efficient device for overhead lifting. The mechanical, electrical and safety features of this hoisting and control system shall establish the standard of quality, performance and safety by which hoisting systems of other manufacture shall be evaluated.
2. Each hoist shall be fully tested under full rated load throughout its full travel distance with all its lift lines terminated to the hoist before the hoist is shipped from the manufacturer. Only hoists that successfully pass the following pre-shipment testing shall be sent to any job site. Hoists that are not tested as a complete system with the wire rope and loft blocks that will install with the hoist in the field shall not be acceptable. Testing shall include:
    a. Hoist operation
    b. Hoist/motor speed
    c. Lift line terminations under load
    d. Braking and stopping under load
    e. Load cell functions
    f. Slack line detection
    g. Position sensing
    h. Hoist noise
3. A record of testing and its results shall be available for review at the manufacturer’s facility.

4. A copy of all testing results must be furnished by the installing contractor to the architect or owner representative at the time of system commissioning. Manufacturers who cannot provide testing results shall not be acceptable.
5. Paint as required under this section shall be the manufacturer's standard finish and color except as noted.
6. All equipment items shall be new and conform to applicable provisions of Underwriters' Laboratories (UL), American Standards Association (ASA), American National Standards Institute (ANSI), National Fire Protection Association (NFPA) Life Safety Code 01, National Electric Code (NEC) and PLASA.
    a. Where acceptable equipment items are specified by catalog number only, device shall meet all published manufacturer's specifications. Where quantities or sizes are not given, refer to drawings. Where two or more products are listed, contractor may use either, at his discretion. Equipment shall not be substituted without specific written approval by the Architect under the substitution paragraphs of these specifications.
    b. All pipe battens shall be fabricated from 1.5" Schedule 40 pipe.
    c. All turnbuckles and cable clips shall be drop forged.
    d. All turnbuckles and clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted. Wire rope shall be galvanized. Fasteners, chain, and other miscellaneous hardware shall be either cadmium or zinc plated.
    e. All materials used in this project shall be new, unused and of the latest design. Refurbished materials are not permitted.
    f. In order to establish minimum standards of safety, a minimum factor of 10 shall be required for all equipment and hardware used on this project. In addition, the following factors shall be used:
        1) Cables and fittings 10 Design Factor
        2) Cable bending ratio 26 times diameter
        3) Max. fleet angle 2 degrees
        4) Steel 1/5 of yield
        5) Bearings Two times required load at full for 2000 hours

B. HOISTS

1. Each wire rope lift line shall adhere to a design factor of 10:1 with an ultimate strength of 4200 pounds. All load path components between the building structure and the batten shall exceed the breaking strength of the wire rope. The motor brake shall be rated at least at 125% of the motor torque.
2. Hoists shall be capable of supporting the following loads:
    a. General purpose Variable Speed 0-180 fpm, 1200 pound capacity in standard configuration. Powerhead shall measure no more than 16” high x 16” w x 55 ¼” long and weigh 495 pounds
    b. General purpose 30 fpm 900 pound capacity in standard configuration. Powerhead shall measure 16” high x 16” w x 47 1/2” long and weigh 395 pounds
    c. General purpose 30 fpm 1400 pound capacity in standard configuration. Powerhead shall measure 16” high x 16” w x 47 1/2” long and weigh 395 pounds
    d. General purpose 30 fpm 2000 pound capacity in standard configuration. Powerhead shall measure 16” high x 18” w x 53 1/2” long and weigh 580 pounds

e. Stage Electric 30 fpm 650 pound capacity in standard configuration. Powerhead shall measure 16” high x 16” w x 47 1/2” long and weigh 395 pounds

f. Stage Electric 30 fpm 1000 pound capacity in standard configuration. Powerhead shall measure 16” high x 16” w x 47 1/2” long and weigh 395 pounds

g. Stage Electric 30 fpm 1500 pound capacity in standard configuration. Powerhead shall measure 16” high x 18” w x 53 1/2” long and weigh 580 pounds

3. The standard general purpose hoist shall consist of the following major components: 1) Powerhead, 2) Right Angle Cable Adjuster (RACA) and 3) pipe batten.

4. The standard stage electric hoist shall consist of the following major components: 1) Powerhead, 2) cable management system, loft blocks, lift line and lift line terminations Right Angle Cable Adjuster (RACA), 3) pipe batten and power/control distribution strip

5. The hoist shall include the following features:

a. A Powerhead containing the following elements: the gear motor, motor brake, load brake, limit switches operating electronics, load cell, slack line detector, absolute position sensors, cable drum assembly, and wire rope.

b. The hoist shall incorporate a built-in load cell.

c. The hoist shall incorporate a built-in slack line sensor.

d. The hoist shall include the emergency contactor built into the hoist.

e. Hoists that do not include built-in load cell, built-in slack line detection, and an emergency contactor shall not be acceptable.

f. Hoists that do not use absolute position encoders shall not be acceptable.

6. The hoist shall be manufactured from UL Listed components and shall be UL Listed and tested as a complete system (not just UL listed parts).

C. POWERHEAD

1. The Powerhead shall be a fully enclosed, powder coated sheet metal housing that shall prevent contact with moving and electrical parts and shall provide protection against dirt, dust and debris.

2. Hoist assemblies that do not have metal housings prohibiting access to moving parts shall not be acceptable.

3. For setup and maintenance, the following functions shall be available from the Powerhead: power and operating switches, address setting knobs, limit switch setting knobs, limit switch override button, indicators for power, status and communication. Each of these functions shall be clearly labeled.

D. GEARMOTOR AND MOTOR BRAKE

1. The gear motor and motor brake shall be an integral unit from a single manufacturer. It shall operate on 208 Volt or 480 Volt 60 Hz, 3 phase current for fixed speed units and 480 Volt, 60 Hz, 3 phase current for variable speed hoists.

2. The motor brake shall be integral to the gear motor and shall be capable of holding 125% of the motor full load torque.

3. The motor brake shall be spring actuated to apply and hold braking force.

4. The motor brake shall be magnetically released and held open upon actuation.

E. LOAD BRAKE

1. Fixed Speed Hoists
    a. The rotary disk load brake shall bring the moving load to a complete stop and shall hold the load in position in the event of a mechanical failure of the motor, motor brake or gearbox.
    b. Noise from the load brake shall be minimally audible at any time in the operational cycle.
    c. Normal hoist operation shall not be limited by heat or noise caused by the load brake.
    d. The load brake shall be electrically released when the load is moving in the up direction. The load brake shall always be engaged when the load has stopped moving either up or down.
2. Variable Speed Hoists
    a. The rotary disk load brake shall open upon activation of hoist movement and shall close after the load has come to a stop; it shall hold the load in position.
    b. Noise from the load brake shall be minimally audible at any time in the operational cycle.
    c. Normal hoist operation shall not be limited by heat or noise caused by the load brake.
    d. The load brake shall be electrically released when the load is moving either up or down. The load brake shall always be engaged when the load has stopped moving either up or down.

F. WIRE ROPE DRUM
1. The drum shall be capable of wrapping up to eight 3/16” diameter 7 x 19 galvanized aircraft (utility) wire rope lift lines up to 50’ long in a compact manner. They shall be managed by a wire rope (cable) keeper integral to the Powerhead. The drum design shall prevent wire rope from tangling or crossing over itself.

G. LIMIT SWITCH
1. A limit switch assembly shall be mounted within the Powerhead for hard “normal” and “ultimate” end of travel limits. Hard end of travel limits shall be set/adjusted at the time of installation aided by an indicator light visible on the bottom panel of the Powerhead cover. Any system that indicates that the limit has been set by audible or tactile means only shall not be acceptable.

H. LOAD SENSOR/LOAD PROFILING.
1. A load sensor shall be built into the Powerhead to create a profile of the actual load on the hoist as it travels through its normal cycle. The profile may be changed by “re-training” the profiling system whenever the suspended load is changed on the batten by activating a key-switch operated training cycle on the motor controller. The load sensor shall continuously monitor the load when load sensing is turned on.

I. POSITION SENSOR
1. A position sensing system shall be built into the Powerhead to provide accurate position information. The system shall consist of two absolute sensor types that provide accurate position information for each batten at power-up of the system. Hoisting systems that require re-homing shall not be acceptable. Incremental encoders shall not be acceptable for position readout purposes.

J. SLACK LINE DETECTOR
1. The slack line detector shall be built into the Powerhead. When a slack line condition in excess of 15” develops in a lift line, the slack line detector shall remove power from the hoist.

The batten shall be allowed to move only in the upward direction to allow removal of the cause of the slack line fault.

K. LOCAL USER INTERFACE TO POWERHEAD

1. User interface at the Powerhead control panel at the rear of the hoist shall include:
    a. Hoist Up/Down Control
    b. Limit Switch override buttons (tool accessible)
    c. Address switches
    d. Status LEDs

L. INFORMATION STORAGE WITHIN POWERHEAD

1. Record of severe fault conditions with date and time stamp
2. Record of E-stops, overloads, moves and power cycles
3. Record of travel distance and peak loads since installation/inspection
4. Hoist systems that do not record the above data shall not be acceptable.

M. LOFT BLOCKS

1. Each loft block shall be an assembly of steel side plates, a wire rope idler, sheave, bearings, shaft locked against rotation and support hardware. The blocks shall be positioned no closer than 4’-0” from each other, unless muled.
2. Loft block sheaves shall measure 5” in diameter and contain a pair of press fit sealed ball bearings. Lift lines shall travel in a groove shaped and sized for 3/16” diameter wire rope per the latest edition of the Wire Rope Users’ Manual as published by the Wire Rope Technical Board. The loft block sheave shall be concentric about the hub and shall be evenly balanced for ease of rotation.
3. An idler shall be incorporated into the top assembly of the loft block to guide and support lift lines as they pass the block.
4. Hoisting systems requiring the loft blocks to be mounted directly to the facility structure shall not be accepted for this project.

N. LIFT LINE TERMINATIONS

1. Each lift line shall be terminated in the Powerhead via a standard copper oval compression sleeve installed/crimped at the factory.
2. Lift lines shall be terminated at the load hanger with a low profile Right Angle Cable Adjuster (RACA) ™, thimble and copper oval compression sleeve. The RACA and cable terminations at the batten shall be installed at the time of hoist installation.
3. Batten trim shall be adjustable up to 6” via the RACA.
4. Systems utilizing turnbuckles or chain to trim the batten shall not be accepted for this installation.

O. HANGERS

1. Raceway hangers shall be specially shaped flat bar that shall support the wire rope termination hardware and secure the raceway and the pipe batten.

P. CABLE MANAGEMENT FOR ELECTRICS

1. PRODIGY CABLE MANAGEMENT for ELECTRICS

a. The load circuits and control wiring shall be fed to the distribution trough by a built-in cable management system that allows flat feeder cable to fold and store along the top of the connector strip.

1) At high trim, the entire system shall be stored in 30” of vertical space from the bottom of the mounting steel to the horizontal centerline of the batten. Cable management systems requiring greater vertical storage space shall not be acceptable for this project.

2) The cable management system shall be integral to the hoist system.

3) The cable management system shall be UL LISTED.

4) The flat cable shall meet the physical as well as thermal requirements of UL for 20 amp loads. Up to four flat cables may be fed from each end of the distribution system to provide power for 24 circuits from each end of the system for a maximum of 48 total circuits.

5) Each flat cable shall include one ground wire and one data cable plus an individually insulated hot and an individually insulated neutral conductor for each of six 120 Volt 20 Amp circuits.

6) The connector strip shall be built to the length specified with outlets or pigtails located as specified or as shown on the construction drawings. Outlets or plugs shall be 15 amp grounded pin connectors, 15 amp twistlock connectors, or 15 amps Edison plugs. The distro trough may also contain connectors for Ethernet and/or DMX connections.

7) Flat cable shall pass through a strain relief before entering a termination box at the designated end of the raceway. Within the raceway all wiring shall be attached at the factory to a terminal block. The flat cable, internal wiring and all components shall meet UL requirements and appropriate National Electrical Codes (NEC).

b. Cable management systems that utilize cable cradles, cable reels or locate feeder or data cables outside the off stage edges of the electrics batten shall not be acceptable for this project.

c. Hoisting systems utilizing cable management systems from third-party vendors shall be fully integrated into the hoisting system without additional structural changes or changes to the QuickTouch controller. Electrics line set hoisting systems that do not fully integrate cable management in the hoisting system and controller shall not be acceptable for this installation. Cable management systems that are not UL LISTED shall not be accepted for this installation.

2. PANTOGRAPH CABLE MANAGEMENT FOR ELECTRICS

a. The load circuits and data wiring shall be fed to the distribution trough by one or more UL Listed Pantograph cable management systems that are specifically designed to interface with traditional stage distribution raceways. The pantograph shall allow the cable trays, feeder cable and data wiring to fold and store along the top of the connector strip without imposing a direct physical load on the connector strip.

b. The pantograph shall consist of a series of 18 ga. ventilated steel trays hinged to each other to allow the entire distance of travel required by the batten, up to 50’. The hinges and hinge attachment points shall be stiffened to prevent distortion of the pantograph.

c. The flat cable shall be UL LISTED.

d. The pantograph shall support a double-high/double wide stack of flat cable and shall allow the flat cable to bend at each joint within required NEC bending radii.

e. The trays shall hinge open/closed as the batten is lowered/raised and shall not impede the movement of the line set

f. The trays shall be sufficiently stiff to support themselves and the flat cable they carry. At no time shall the trays bow, warp, sag or twist whether or not under load of the flat cable.

g. Flat cable in the pantograph tray shall never heat in excess of the rated temperature maximum of the flat cable when all circuits within the tray are loaded at maximum electrical capacity.

h. It shall be possible to provide power for up to sixteen 20 amp circuits plus ground and data via each pantograph.

i. These cable management systems shall interface with the circuit distribution trough with standard mechanical and electrical hardware purpose designed for this assembly.

j. Circuit and data terminations between the pantograph and distribution strip shall be performed by the manufacturer. Cable management systems that require terminations at the distribution trough in the field shall not be acceptable.

k. Hoisting systems utilizing cable management systems from third-party vendors shall be fully integrated into the hoisting system without additional custom hardware, changes to any part of the pantograph or changes to the QuickTouch controller.

l. Hoisting systems that do not fully integrate cable management in the hoisting system and controller shall not be acceptable for this installation.

3. TRADITIONAL CABLE MANAGEMENT FOR ELECTRICS

a. Load circuits and data wiring shall be fed to a standard stage distribution trough by multi-conductor SO cable supported by cable cradles suspended from one of the Prodigy hoist lift lines. The SO cable shall be held in place at the distro by means of a dedicated strain relief assembly.

b. Single or multiple multi-conductor SO cables and multiple cable cradles can be suspended from a single lift line so long as the Working Load Limit (WLL) of the lift line is not exceeded.

4. CONNECTOR STRIP—DISTRO and HOUSELIGHT TROUGH

a. A Houselight Trough shall be a formed sheet metal trough made from 18 ga. Steel. The trough shall be reinforced with 12 ga. formed steel at each utilized fixture attachment point. The trough shall enclose internal wiring to which fixture wiring is terminated within the trough.

b. The system may incorporate an internal barrier to permit emergency circuit wiring in the same trough.

c. The trough shall be powder coated.

d. Circuit wiring shall be supplied to the trough via an ETC Pantograph cable management system.

e. Cable management shall utilize an ETC Prodigy pantograph that allows up to sixteen line-voltage circuits, or a combination of line–voltage and up to two emergency circuits. Knockouts located 6” on-center are built into the raceway. The knockouts permit installation of houselights with canopy or stem mounts to attach directly to the raceway. Up to 50 pounds may be suspended between raceway supports.

f. Pantograph cable management and houselight distribution is UL LISTED for use with flat cable circuit distribution and fixture mounting as described above.

g. Houselight troughs are designed to be used without pipe battens.

Q. PIPE BATTEN

1. The pipe batten shall be 1½" schedule 40 grade A, seamless pipe fabricated in the largest possible lengths without splices. Battens of greater length shall be spliced by means of .120 x 1 9/16 dia. DOM tube 18" long with 9" of tube inserted into each half of the splice. The tight fitting splice tube shall be held in place by a pair of 3/8 x 2 ½" grade 5 hex bolts on each side of the joint. The bolts shall pass through the pipe at an angle of 90° to each other. There shall be two bolts on each side of the joint spaced 1" and 8" from the joint. Alternatively, one pair of bolts on one side of the joint may be replaced with either plug welds or tight fitting steel rivets. Pipes shall be straight and painted flat black.
2. A safety-yellow batten cap shall be installed at each end of each pipe batten.
3. The manufacturer shall provide up to four self-adhesive labels for each batten on which the rated batten load shall be written by the installer.

R. POWER AND CONTROL DISTRIBUTION (PCD)

1. Each hoist shall receive power and control via a pair of 8'-0" long cables extending from the Powerhead to the source outlets. Receptacles shall be installed in a sheet metal junction box or trough with outlets. Each outlet shall be located no more than 6'-0" away from the rear face of each hoist.
2. Each Powerhead shall include a power cord hardwired to the hoist with an appropriately sized grounded twist-lock connector at the PCD end and a removable control cable with a circular 9 pin connector at each end. An appropriately rated 3 phase breaker in the PCD is included. The wiring and connectors shall be barriered between high and low voltage.
3. The power/distribution channel shall be UL LISTED for this application.

PART 2 - RIGGING MOTORIZED HOISTS

2.01 RIGGING MOTORIZED HOISTS

A. GENERAL

1. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights, equipment, curtains and scenic elements, whether used on stage, in the auditorium or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered, efficient device for overhead lifting. Hoists shall be FlyPipe by ETC, Inc., or approved equal
2. Anodization as required under this section shall be the manufacturer's standard finish and color except as noted
3. All equipment items shall be new and conform to applicable provisions of Underwriters' Laboratories (UL 1340), American National Standards Institute (ANSI E1.6-1:2018, and C63.4:2014), and the National Fire Protection Association (NFPA 70)
4. Where acceptable equipment items are specified by catalog number only, device shall meet all published manufacturer's specifications. Where quantities or sizes are not given, refer to drawings. Where two or more products are listed, contractor may use either, at his discretion. Equipment shall not be substituted without specific written approval by the Architect under the substitution paragraphs of these specifications
5. Provided wire rope shall be galvanized
6. All materials used in this project shall be new, unused and of the latest design. Refurbished materials are not permitted

7. In order to establish minimum standards of safety, a minimum design factor of 10 shall be required for all equipment and hardware used on this project. In addition, the following factors shall be used:
    a. Cables and fittings 10:1 Design Factor
    b. Cable bending ratio 25 times diameter
    c. Maximum fleet angle 0 degrees

B. HOISTS
1. Hoist shall be self-climbing with a maximum supported travel of 50’
    a. Hoists which are not self-climbing shall not be acceptable
2. Each dual 1/8” wire rope lift line sets shall adhere to a design factor of 10:1 with an ultimate combined strength of 4,200 pounds
3. Configured hoists components shall be capable of supporting a total live load of 500 pounds suspended from the batten as follows:
    a. General purpose FlyPipe Drive Section shall measure 26.25” high x 14” w x 11’-0.5” long and weigh 140 pounds
    b. General purpose FlyPipe End Section shall measure 12” high x 5.5” w x 7’-1.5” long and weigh 40 pounds
    c. General purpose FlyPipe Span Section shall measure 12” high x 5.5” w x 10’0” long and weigh 60 pounds
4. The FlyPipe self-climbing hoist shall consist of the following major components:
    a. Motor Section
    b. Span Sections (if required)
    c. End Section
    d. A set of TwinLines (dual 1/8” GAC lift lines) per section
    e. One TwinLine Clamp per set of lift lines
    f. Pipe batten (if required)
5. Integrated into the bottom of the FlyPipe sections will be an aluminum strut-compatible channel. The channel shall support point loads up to 250 pounds
    a. Hoists which do not support direct connection of stage equipment or lighting fixtures shall not be acceptable
6. The hoist shall be manufactured from UL Listed components and shall be UL Listed and tested as a complete system (not just UL listed parts)

C. DRIVE SECTION
1. The Drive Section shall include a fully enclosed, powder coated sheet metal housing that shall prevent contact with moving and electrical parts and shall provide protection against dirt, dust and debris
2. The Drive Section shall contain the following elements: the gear motor, motor brake, limit switches, remote operating electronics, slack line detector, position sensor, cable drum assembly, and wire rope
3. The hoist shall incorporate a built-in slack line sensor

4. The hoist shall include the emergency contactor built into the hoist
5. The following functions shall be available: operating switches, address setting knobs, limit switch override buttons, indicators for power, status and communication. Each of these functions shall be clearly labeled

D. GEARMOTOR AND MOTOR BRAKE

1. The gear motor and motor brake shall be an integral unit from a single manufacturer. It shall operate on 208 Volt or 480 Volt 60 Hz 3-phase power
2. The motor brake shall be integral to the gear motor and shall be capable of holding 125% of the motor full load torque
3. The motor brake shall be electro-magnetically held open, and spring actuated to apply and hold braking force

E. Over Speed Load Arrest Brake

1. The over speed mechanism shall detect a runaway condition and trigger a load arresting device to stop the load
2. Noise from the over speed brake shall not be audible at any time in the operational cycle of the hoist
3. Normal hoist operation shall not be limited by heat or noise caused by the load brake

F. WIRE ROPE DRUM

1. Each Drive, Span, and End Section shall contain one drum
2. Each drum shall accommodate two, 1/8” diameter 7 x 19 galvanized aircraft (utility) wire rope lift lines up to 50’ long in a compact manner on the cable drum. The drum design shall prevent wire rope from tangling or crossing over itself

G. LIMIT SWITCH

1. A limit switch assembly shall be mounted within the Drive Section for hard “normal” and “ultimate” end of travel limits. Hard end of travel limits shall be set/adjusted at the time of installation
    a. Installation shall be aided by an indicator light visible on a panel of the Drive Section enclosure. Any system that indicates that the limit is set only by audible or tactile means only shall not be acceptable

H. POSITION SENSOR

1. A position sensing system shall be built into the Drive Section to provide accurate position information. The system shall consist of an encoder sensor that provides accurate position information for each batten at power-up of the system, and continually throughout its normal operation. Hoisting systems that require re-homing shall not be acceptable

I. SLACK LINE DETECTOR

1. The slack line detector shall be built into the Drive Section. When a slack line condition in excess of 24” develops in a lift line, the slack line detector shall remove power from the hoist. The hoist shall be allowed to move only in the upward direction to allow removal of the cause of the slack line fault

J. LOCAL USER INTERFACE

1. User interface located on the Drive Section shall include:
    a. Hoist Up/Down Control

b. Limit Switch Override buttons (tool accessible)

c. Address switches

d. Status LEDs

K. INFORMATION STORAGE WITHIN DRIVE SECTION

1. Record of severe fault conditions with date and time stamp
2. Record of E-stops, overloads, moves and power cycles
3. Record of travel distance since installation/inspection

L. HOIST POWER AND CONTROL CABLES

1. Each Drive Section shall require a power cord and Cat 5e (or better) connected between receptacles mounted in the hoist and hoist power and communication distribution (PCD) equipment by ETC. Inclusion of a 20 amp 3-phase breaker in the PCD is optional. PCD equipment shall incorporate a barrier between high and low voltage components. Proper strain relief at the Drive Section shall be provided

M. PIPE BATTEN

1. A pipe batten with a 48.3mm outside diameter constructed of 3.8mm extruded aluminum with a 3.8mm vertical web shall be available for use with the hoist
2. The pipe batten shall be extruded with a witness line to indicate the position of the web
3. The pipe batten shall support a maximum distributed load of 150lb / 68kg over a 10ft / 305cm span
4. The pipe batten shall support a maximum point load of 65lb / 29kg over a 10ft / 305cm span
5. The pipe batten shall weigh no more than 1.5lbs/ft, battens that weighs more than 1.5lbs/ft shall not be acceptable
6. The pipe batten shall be designed to a 10:1 safety factor
7. The pipe batten shall be finished with black hardcoat anodization

N. POWER AND CONTROL DISTRIBUTION

1. The hoist and hoist cable management system shall allow for the attachment of dedicated circuit and data distribution equipment
2. The circuit and data distribution equipment shall be UL Listed for this application

O. CABLE MANAGEMENT

1. Supplied motor power and control wiring shall be fed to the motor control enclosure by multi-conductor SO cable and Cat 5e (or better) cable. Each cable shall be held in place at the enclosure by means of a dedicated strain relief assembly

P. HELIX CABLE MANAGEMENT FOR ELECTRICS

1. The load circuits and data wiring shall be fed to the power distribution equipment by one or more UL Listed helix cable management systems. The helix shall allow the feeder cable and data wiring to stack and store without imposing a direct physical load on the connector strip
2. The helix shall consist of a series of steel ribs connected to each other with nylon straps to allow the entire distance of travel required by the batten, up to 50’
3. The nylon straps shall attach directly to building structure. At the bottom, the helix shall be attached to a steel plate in a manner that imposes no additional physical load on the power distribution equipment

4. The helix shall support two pairs of cables:
    1) One hoist power and data pair with factory-installed connectors at each end
    2) One distribution power and data pair which shall be unterminated. Distribution power cable shall support either three or six 20A circuits. Circuits may be 120V, 208V, or a combination of the two. Data distribution cable shall be a single Cat 5e which may be used to transmit either DMX or Ethernet
    3) Hoist power and distribution equipment power cables be multi-conductor SO cable. The SO cables and data cables shall be held in place by means of a dedicated strain relief assembly.
    4) All cables shall be UL LISTED
5. The helix shall support each pair on opposite ends of each steel rib, managing the cables within required NEC bending radii
6. The ribs shall stack/separate as the batten is lowered/raised and shall not impede the movement of the line set
7. Cables supported by the helix shall never heat in excess of the rated temperature maximum of the cable when all circuits are loaded at maximum electrical capacity
8. Circuit and data terminations between the helix and distribution equipment shall be performed in the field.

2.02 RIGGING MOTORIZED HOISTS

A. General

1. Hoists shall be the ETC Prodigy P2 as manufactured by ETC, Inc or equal.
2. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights, equipment, curtains and scenic elements, whether used on stage, in the auditorium or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered, efficient device for overhead lifting. The mechanical, electrical and safety features of this hoisting and control system shall establish the standard of quality, performance and safety by which hoisting systems of other manufacture shall be evaluated.
3. Each hoist shall be fully tested under full rated load throughout its full travel distance with all its lift lines terminated to the hoist before the hoist is shipped from the manufacturer. Only hoists that successfully pass the following pre-shipment testing shall be sent to any job site. Testing shall include:
    a. Hoist operation
    b. Hoist/motor speed
    c. Lift line terminations under load
    d. Braking and stopping under load
    e. Load cell functions
    f. Slack line detection
    g. Position sensing
    h. Hoist noise
4. A record of testing and its results shall be available for review at the manufacturer’s facility.

5. A copy of all testing results must be furnished by the installing contractor to the architect or owner's representative at the time of system commissioning. Manufacturers who cannot provide testing results shall not be acceptable.
6. Paint as required under this section shall be the manufacturer's standard finish and color except as noted.
7. All equipment items shall be new and conform to applicable provisions of Underwriters' Laboratories (UL), American Standards Association (ASA), American National Standards Institute (ANSI), National Fire Protection Association (NFPA) Life Safety Code 01, National Electric Code (NEC) and PLASA.
    a. Where acceptable equipment items are specified by catalog number only, device shall meet all published manufacturer's specifications. Where quantities or sizes are not given, refer to drawings. Where two or more products are listed, contractor may use either, at his discretion. Equipment shall not be substituted without specific written approval by the Architect under the substitution paragraphs of these specifications.
    b. All pipe battens (if used) shall be fabricated from 1.5" Schedule 40 pipe.
    c. All turnbuckles and cable clips (if used) shall be drop forged.
    d. All turnbuckles and clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted. Wire rope shall be galvanized. Fasteners, chain, and other miscellaneous hardware shall be either cadmium or zinc plated.
    e. All materials used in this project shall be new, unused and of the latest design. Refurbished materials are not permitted.
    f. In order to establish minimum standards of safety, a minimum factor of 10 shall be required for all equipment and hardware used on this project. In addition, the following factors shall be used:
        1) Cables and fittings 10 Design Factor
        2) Cable bending ratio 26 times diameter
        3) Maximum fleet angle 2 degrees
        4) Bearings Two times required load at full for 2,000 hours

B. HOISTS

1. Each wire rope lift line shall adhere to a design factor of 10:1 with an ultimate strength of 4200 pounds. All load path components between the building structure and the batten shall exceed the breaking strength of the wire rope. The motor brake shall be rated at least at 125% of the motor torque.
2. Hoists shall be capable of supporting the following loads:
    a. General purpose P2-EXO 25 fpm 650 pound capacity in standard configuration. Powerhead shall measure 16" high x 13-1/2" wide x 45-1/2" long and weigh 300 lbs where compression tube is not used.
3. The standard general purpose hoist shall consist of the following major components: 1) Powerhead, 2) Head block (if used), 3) Loft blocks, 4) Lift lines, 5) Right Angle Cable Adjuster (RACA), and 6) pipe batten.
4. The hoist shall include the following features:
    a. A Powerhead containing the following elements: the gear motor, motor brake, secondary load arrest device, limit switches, operating electronics, load cell, slack line detector, incremental position sensors, cable drum assembly, and wire rope.

b. The hoist shall incorporate a built-in load cell.

c. The hoist shall incorporate a built-in slack line sensor.

d. The hoist shall include the emergency contactor built into the hoist.

e. Hoists that do not include built-in load cell, built-in slack line detection, and an emergency contactor shall not be acceptable.

f. Hoists that do not use position encoders shall not be acceptable.

5. The hoist shall be manufactured from UL Listed components and shall be UL Listed and tested as a complete system (not just UL listed parts).

C. POWERHEAD

1. The Powerhead shall be a fully enclosed housing that shall prevent contact with moving and electrical parts and shall provide protection against dirt, dust and debris. An exo-skeleton frame surrounding the hoist allows for multiple mounting options including: upright, underhung and vertical.

2. Hoist assemblies that do not have housings prohibiting access to moving parts shall not be acceptable.

3. For setup and maintenance, the following functions shall be available from the Powerhead: power and operating switches, address setting knobs, limit switch adjustment mechanism, limit switch override button, indicators for power, status and communication. Each of these functions shall be clearly labeled.

D. GEARMOTOR AND MOTOR BRAKE

1. The gear motor and motor brake shall be an integral unit from a single manufacturer. It shall operate on 208 Volt or 480 Volt 60 Hz, 3 phase, or 400 Volt 50 Hz, 3 phase.

2. The motor brake shall be integral to the gear motor and shall be capable of holding 125% of the motor's lifting capacity.

3. The motor brake shall be spring actuated to apply and hold braking force.

4. The motor brake shall be magnetically released and held open upon actuation.

E. SECONDARY LOAD ARREST DEVICE

1. Hoist shall include redundant load arrest device utilizing a dynamically self-locking gearbox in addition to primary electro-mechanical motor brake.

2. The dynamically self-locking gearbox shall bring the moving load to a complete stop and shall hold the load in position in the event of a mechanical failure of the motor or motor brake.

a. Noise from the load arrest device shall be minimally audible at any time in the operational cycle.

3. Normal hoist operation shall not be limited by heat or noise caused by the secondary load arrest device.

F. WIRE ROPE DRUM

1. The drum shall be capable of wrapping up to eight 3/16" diameter 7 x 19 galvanized aircraft (utility) wire rope lift lines up to 50' long in a compact manner. They shall be managed by a wire rope (cable) keeper integral to the Powerhead. The drum design shall prevent wire rope from tangling or crossing over itself.

G. LIMIT SWITCH

1. A limit switch assembly shall be mounted within the Powerhead for hard “normal” and “ultimate” end of travel limits. Hard end of travel limits shall be set/adjusted at the time of installation aided by an indicator lights visible on the Powerhead cover. Any system that indicates that the limit has been set by audible or tactile means only shall not be acceptable.

H. LOAD SENSOR/LOAD PROFILING.

1. A load sensor shall be built into the Powerhead to facilitate a profile of the actual load on the hoist as it travels through its normal cycle. The profile may be changed by “re-training” the profiling system whenever the suspended load is changed on the batten by activating a key-switch operated record cycle, or the appropriate password-protected account type on the motor controller. When Load Profiling is turned on for that hoist, the load sensing system shall continuously monitor the load, regardless of whether the hoist is in a dynamic or static state.

I. POSITION SENSOR

1. A position sensing system shall be built into the Powerhead to provide accurate position information. The system shall consist of an incremental encoder that provides accurate position information for each batten at power-up of the system. Hoisting systems that require re-homing shall not be acceptable.

J. SLACK LINE DETECTOR

1. The slack line detector shall be built into the Powerhead. When a slack line condition in excess of 15” of travel develops in a lift line, the slack line detector shall remove power from the motor and engage the primary brake. The batten shall be allowed to move only in the upward direction to allow removal of the cause of the slack line fault.
2. Notification of a fault state will be indicated on the hoist via diagnostic indicators, and in plain language at the hoist controller.
3. Once the cause of the slack line fault has been removed, normal operation will automatically be restored without additional action by the operator.

K. LOCAL USER INTERFACE TO POWERHEAD

1. User interface at the Powerhead control panel at the rear of the hoist shall include:
   a. Hoist Up/Down Control
   b. Limit Switch override buttons (tool accessible)
   c. Address switches
   d. Status LEDs

L. INFORMATION STORAGE WITHIN POWERHEAD

1. The hoist system shall record the following information into non-volatile memory, and be available for analysis via log files:
   a. Severe fault conditions with date and time stamp
   b. E-stops, overloads, moves and power cycles
   c. Cumulative travel distance, hours of operation and peak loads since installation/last inspection
   d. Record of last known position
      1) Hoist systems that do not record the above data into non-volatile memory shall not be acceptable.

M. LIFT LINE TERMINATIONS

1. Each lift line shall be terminated in the Powerhead via a standard copper oval compression sleeve installed/crimped at the factory.
2. Lift lines shall be terminated at the load hanger with a low profile Right Angle Cable Adjuster (RACA)™, thimble and copper oval compression sleeve. The RACA and cable terminations at the batten shall be installed at the time of hoist installation.
3. Batten trim shall be adjustable up to 6” via the RACA.
4. Systems utilizing turnbuckles or chain to trim the batten shall not be accepted for this installation.

N. HANGERS

1. Raceway hangers shall be specially shaped flat bar that shall support the wire rope termination hardware and secure the raceway and the pipe batten.

O. CABLE MANAGEMENT FOR ELECTRICS

1. PANTOGRAPH CABLE MANAGEMENT FOR ELECTRICS

a. The load circuits and data wiring shall be fed to the distribution trough by one or more UL Listed Pantograph cable management systems that are specifically designed to interface with traditional stage distribution raceways. The pantograph shall allow the cable trays, feeder cable and data wiring to fold and store along the top of the connector strip without imposing a direct physical load on the connector strip.

b. The pantograph shall consist of a series of 18 ga. ventilated steel trays hinged to each other to allow the entire distance of travel required by the batten, up to 50’. The hinges and hinge attachment points shall be stiffened to prevent distortion of the pantograph.

c. The trays shall be connected to a moving trolley near the loft blocks that allows relief as the system moves slightly from side to side during ascent/descent of the batten. At the bottom, the pantograph shall be attached to a hinge point above the houselight or distribution trough in a manner that imposes no additional physical load on those assemblies. The flat cable in the trays shall exit the pantograph and enter a termination box on the distro strip where all electrical connections shall be made.

d. The flat cable shall be UL LISTED.

e. The pantograph shall support a double-high/double wide stack of flat cable and shall allow the flat cable to bend at each joint within required NEC bending radii.

f. The trays shall hinge open/closed as the batten is lowered/raised and shall not impede the movement of the line set

g. The trays shall be sufficiently stiff to support themselves and the flat cable they carry. At no time shall the trays bow, warp, sag or twist whether or not under load of the flat cable.

h. Flat cable in the pantograph tray shall never heat in excess of the rated temperature maximum of the flat cable when all circuits within the tray are loaded at maximum electrical capacity.

i. It shall be possible to provide power for up to sixteen 20 amp circuits plus ground and data via each pantograph.

j. These cable management systems shall interface with the circuit distribution trough with standard mechanical and electrical hardware purpose designed for this assembly.

k. Circuit and data terminations between the pantograph and distribution strip shall be performed by the manufacturer. Cable management systems that require terminations at the distribution trough in the field shall not be acceptable.

l. Hoisting systems utilizing cable management systems from third-party vendors shall be fully integrated into the hoisting system without additional custom hardware, changes to any part of the pantograph or changes to the QuickTouch controller.

m. Hoisting systems that do not fully integrate cable management in the hoisting system and controller shall not be acceptable for this installation.

P. TRADITIONAL CABLE MANAGEMENT FOR ELECTRICS

1. Load circuits and data wiring shall be fed to a standard stage distribution trough by multi-conductor SO cable supported by cable cradles suspended from one of the Prodigy hoist lift lines. The SO cable shall be held in place at the distro by means of a dedicated strain relief assembly.

2. Single or multiple multi-conductor SO cables and multiple cable cradles can be suspended from a single lift line so long as the Working Load Limit (WLL) of the lift line is not exceeded.

Q. CONNECTOR STRIP—DISTRO and HOUSELIGHT TROUGH

1. A Houselight Trough shall be a formed sheet metal trough made from 18 ga. Steel. The trough shall be reinforced with 12 ga. formed steel at each utilized fixture attachment point. The trough shall enclose internal wiring to which fixture wiring is terminated within the trough.

2. The system may incorporate an internal barrier to permit emergency circuit wiring in the same trough.

3. The trough shall be powder coated.

4. Circuit wiring shall be supplied to the trough via an ETC Pantograph cable management system.

5. Cable management shall utilize an ETC Prodigy pantograph that allows up to sixteen line-voltage circuits, or a combination of line–voltage and up to two emergency circuits. Knockouts located 6” on-center are built into the raceway. The knockouts permit installation of houselights with canopy or stem mounts to attach directly to the raceway. Up to 50 pounds may be suspended between raceway supports.

6. Pantograph cable management and houselight distribution is UL LISTED for use with flat cable circuit distribution and fixture mounting as described above.

7. Houselight troughs are designed to be used without pipe battens.

R. PIPE BATTEN

1. The pipe batten shall be 1½” schedule 40 grade A, seamless pipe fabricated in the largest possible lengths without splices. Battens of greater length shall be spliced by means of .120 x 1 9/16 dia. DOM tube 18” long with 9” of tube inserted into each half of the splice. The tight fitting splice tube shall be held in place by a pair of 3/8 x 2 ½” grade 5 hex bolts on each side of the joint. The bolts shall pass through the pipe at an angle of 90° to each other. There shall be two bolts on each side of the joint spaced 1” and 8” from the joint. Alternatively, one pair of bolts on one side of the joint may be replaced with either plug welds or tight fitting steel rivets. Pipes shall be straight and painted flat black.

2. A safety-yellow batten cap shall be installed at each end of each pipe batten.

3. The manufacturer shall provide up to four self-adhesive labels for each batten on which the rated batten load shall be written by the installer.

S. POWER AND CONTROL DISTRIBUTION (PCD)

1. Each hoist shall receive power and control via a pair of 8’-0” long cables extending from the Powerhead to the source outlets. Receptacles shall be installed in a sheet metal junction box or trough with outlets. Each outlet shall be located no more than 6’-0” away from the rear face of each hoist.
2. Each Powerhead shall include a power cord hardwired to the hoist with an appropriately sized grounded twist-lock connector at the PCD end and a removable control cable with a circular 9 pin connector at each end. An appropriately rated 3 phase breaker in the PCD is included. The wiring and connectors shall be barriered between high and low voltage.
3. The power/distribution channel shall be UL LISTED for this application.

2.03 QUICKTOUCH+ FIXED AND VARIABLE SPEED CONTROL SYSTEM

A. GENERAL

1. The entire motor system shall be operated by a QuickTouch+ fixed and variable speed controller. It shall be purpose-designed and fabricated to manage and operate motors specifically designed for overhead lifting. Each system shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment and shall provide an engineered, efficient device to control the equipment. The mechanical, electrical and safety features of this control system shall establish the standard of quality, performance and safety by which motor systems of other manufacture shall be evaluated.
2. The QuickTouch+ Control System shall consist of a surface, flush or rack mounted primary control panel and up to three remote E-stop stations.
3. The motor system shall also include one Fixed Speed Remote control device with 30’ of flexible cable that may be attached to the system at the QuickTouch+ control panel.
4. The controller shall include the following features:
    a. Key operated power switch
    b. LCD display for feedback/operating information
    c. Key operated motor load profile training/enable switch
    d. Latching motor selection buttons with rear illuminated naming tabs
    e. Rear illuminated hold-to-operate (dead-man) up and down operation buttons
    f. Recessed speed adjustment slide-pot
    g. Rotary data entry encoder
    h. Dedicated E-stop button
    i. Outlet for wired remote
    j. Optional door
    k. Optional rack mount kit
5. The control system shall only employ the QuickTouch+ controller, a power and control distribution infrastructure and the motors. A System that requires separate drive cabinets or motor-starters shall not be acceptable.
6. The controller shall be UL LISTED and shall be fabricated from UL LISTED components.

B. ENCLOSURE

1. The back box and face panel shall be fabricated from 16ga powder coated sheet steel specially formed to provide support for installation as well as support for all components installed within the housing.
2. The QuickTouch+ face panel shall be printed with complete labeling information to identify the function of each of the buttons in the control station.
3. The face panel shall identify the system as a QuickTouch+ controller for stage rigging.
4. The face panel shall be shades of grey. The ring surrounding the E-stop button shall be safety yellow and shall be rear illuminated
5. The steel panel to which all switches are mounted shall be removable via screws in the surface located underneath the face panel film.

C. LCD SCREEN

1. The liquid crystal display shall be purpose designed to communicate all information in human readable text.
2. The screen shall be rear illuminated and shall be dimmable.
3. During system start up the screen shall show the progress of the motor diagnostics self-tests. Upon completion of the startup sequence the screen shall indicate that the system is “OK” or shall provide specific information should a fault be detected. Fault conditions shall be reported in human readable text. Systems that report fault conditions in a series of blinking lights shall not be acceptable for this installation.
4. When a motor is selected the LCD screen shall readout the motor name and number, the current batten position above the floor, the amount of weight suspended from the batten, the trim position that is recorded, as well as two bar graph scales that show the current position of the batten, top and bottom limits and the current weight suspended from the batten.

D. MOTOR SELECTION/OPERATION BUTTONS

1. There shall be rear illuminated motor selection buttons. Buttons shall remain illuminated until de-selected.
2. Up to four motors may be selected to move at one time. When the up or down button is pushed and held, each motor shall move to its next stop location. If the stop location is the adjustable trim position, the motor can be made to continue to travel in the selected direction by releasing and re-pressing the up or down hold-to-operate button until the next stop for the motor(s) is reached.
3. A maximum of four motors may move at one time and only in one direction at a time.
4. Although four motors moving at one time is the factory default, it shall be possible to increase the quantity of simultaneously moving motors to eight or reduce it to one.
5. The system software will limit the number of simultaneous moving motors. As a backup, there shall be dedicated hardware to detect and disable the system if the system attempts to move more than the configured maximum quantity of motors.
6. All buttons shall fit neatly within each of the cover panel cutouts on the controller.

E. KEY SWITCHES

1. A key switch shall control power to the control system. The key must be in the lock and the key turned to the on position for the motor system to operate.
2. A separate key is required to turn on the load profiling system. That key must be in the lock and turned to the “ON” position for load profiling to function.

3. When load profiling is turned on the motor shall know the amount of weight that is supposed to be supported by the batten at any location in the path of travel. Should the weight exceed or be reduced below the profiled weight by a preset value, the motor shall stop operation until the fault is cleared.

F. SLACK LINE DETECTOR

1. The slack line detector is located in the Powerhead. When a slack line condition occurs, it shall cease motor movement and result in a fault message on the LCD screen on the controller. Movement in the upward direction shall be possible to clear the fault.

G. E-STOP

1. The E-stop button on the QuickTouch controller shall be a mushroom button with a rear illuminated ring surrounding the button. During normal operation the E-stop button shall be in the out position. An E-stop can be activated via this button by firmly pressing the button in. The button shall latch and immediately cause a class zero stop of all fixed speed motors and a class one stop of all variable speed motors in the system. The LCD screen shall report this as an E-stop condition. To continue system operation the E-stop button must be cleared by twisting the button to release the latch. Power to the control station must be cycled off/on to re-initiate the system. This action shall also initiate a self-test of the entire control system and contactors.
2. The illuminated ring around each E-stop button shall be dimmable. The status of the lighted ring shall provide additional information about the state of the system as follows:
   a. Ring at low intensity: no motor moving
   b. Ring at high intensity: motor(s) moving
   c. Ring blinking: system in E-stop condition
3. Up to three remote E-stop stations may be connected to the system. Each additional E-stop station shall operate in the same way as the primary E-stop at the QuickTouch control panel.

H. SYSTEM DIAGNOSTICS

1. Upon energization the control system shall perform an automatic series of diagnostic tests that assure that all system safety functions are working. Should an error in the safety functions be determined, the controller shall report back a fault condition in the LCD display window and shall identify the nature of the fault.
2. Monthly, the system automatically shall perform an additional series of diagnostic tests to determine if there are any problems with any portion of the motor control system safety features. In the event of a problem, the controller shall report back a fault condition in the LCD display window and shall identify the nature of the fault.
3. Eleven months after a system inspection has been performed, the system shall remind the user to schedule a full system maintenance/inspection. The reminder shall remain in the system with a count-down calendar until it is turned off by the factory authorized and trained inspector.
4. The installing contractor shall be able to leave contact information within the system. This information shall be displayed at power up and in the event of severe fault conditions.

I. REMOTE CONTROL PENDANT

1. An optional remote control pendant with 30’ long attached cable and plug shall be provided for the system. The remote control must be plugged to the QuickTouch control panel. When the remote control is plugged in the E-stop on the remote is active. Systems requiring “shunt plugs” to bypass an unplugged remote control connector shall not be acceptable.

2. The remote control provides up/down control for those motors that have been preselected at the QuickTouch controller.

J. TRIM POSITIONS

1. It shall be possible easily to store (and delete) up to five (5) Trim positions per motor
2. The user shall be able to utilize three of these positions as general purpose trim positions, one as user programmable upper limit and one as user programmable lower limit
3. During normal operation, the hoist shall stop at every trim position, but it shall also be possible to select a specific trim position as the target position for the next move.

K. SPEED CONTROL

1. The motor controller shall provide a recessed speed adjustment slider
2. It shall be possible to adjust the speed of a running variable speed motor via this slider. During movement the LCD screen shall show the actual speed of the selected motor
3. It shall be possible to pre-set the speed for the next move for the selected motors. The LCD screen shall display the pre-set speed for the selected motors.

L. SYSTEM COMMISSIONING

1. It shall be possible to commission basic functionality of the system without a laptop computer or additional software.
2. A trained installer shall commission the full system via a laptop computer connected via the built-in USB port in the controller. USB connectivity shall not require special USB drivers.
3. Commissioning software shall feature an inspection report generator that allows a step by step inspection of the control system. Upon completion, the system shall generate an inspection report in PDF format.

PART 3 - INSTALLATION

3.01 GENERAL

A. Installation of this equipment shall only be performed by ETC approved and factory trained theatrical rigging installers. Installation shall be performed in a workmanlike manner and shall strictly adhere to the standards of these specifications and ETC's installation requirements. Where necessary, the installer may make adjustments to accommodate unforeseen impediments to installation. The completed work must achieve all electrical, safety and appearance requirements as established in these specifications.

B. Work shall be performed in accordance with OSHA and local codes.

C. On site welding shall only be performed per AWS D1.1 standards and with advanced approval from the architect or Owner's representative.

D. DIVISION OF RESPONSIBILITIES

1. The RIGGING contractor shall be responsible for providing and installing:
   a. Powerhead
   b. Supplementary steel and/or mounting adapters for the hoisting systems, if required.
   c. Loft blocks
   d. Wire rope lift lines and terminations
   e. On electrics line sets: Cable Management system for distribution raceways, including low-voltage, ground and data wiring

f. On electrics line sets: Factory prewired electrical termination boxes that are part of the cable management system.

g. On electrics line sets: Factory prewired distribution raceway mounted at the bottom of the wire rope on the stage electrics sets

h. Pipe batten attached to RACAs or Hanger Brackets

i. Batten end caps

j. Batten labels

k. Attachment of the prewired twist-lock connector to the Power and Control Distribution outlet

l. Attachment of the prewired circular pin connector data wire to the mating outlet on the Powerhead and on the Power and Control Distribution box

m. Termination of the low voltage data wiring at the controller and at all power and control distribution boxes and at each E-stop station

n. Face plates for all Control Stations, E-stop Stations and Power and Control Distribution Boxes

o. Set limit switches

2. The ELECTRICAL contractor shall be responsible for providing and installing:

a. All pipe, wiring and termination providing line voltage to all the Power and Control Distribution boxes

b. All pipe and wiring connecting data lines between the first Power and Control Distribution Box and the Control station

c. Pipe and wiring connecting data lines between Control Station and first E-Stop Station

d. All pipe and wiring connecting data lines between all E-Stop Stations.

e. Back boxes for all Power and Control Distribution Boxes, the Control Stations and all E-Stop Stations.

END OF SECTION

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SECTION 123216 – PLASTIC LAMINATE CASEWORK AND COUNTERTOPS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Cabinets and counter tops.

B. Casework hardware.

1.02 REFERENCES

A. Countertop Standard: ANSI A161.2

B. Catalog Standards: Manufacturer's catalog numbers may be shown on drawings or in equipment schedule for convenience in identifying certain cabinet work. Unless modified by notation on drawings or otherwise specified, catalog description for indicated number constitutes requirements for each such cabinet.

1.03 SUBMITTALS

A. Submit under provisions of Section 013200.

B. Shop Drawings: Indicate casework locations, large scale plans, elevations, rough-in and anchor placement dimensions and tolerances, clearances required.

C. Product Data: Provide component dimensions, configurations, construction details and joint details.

D. Samples: Submit two samples, minimum size 3 x 6 inches (75 x 150 mm) of each color of finish.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI 161.1.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Stevens Cabinet Company, Inc. Product Architectural Designer Series.

B. L.S.I. Corp. of America, Inc.

C. Trimline Product.

D. Custom fabricated per enclosed specifications.

E. Or approved equal

2.02 BASIC MATERIALS

A. Particleboard: ANSI A208.1 mat. formed particleboard, Grade 1-M- with minimum density of 40 lbs. per cu. ft., internal bond of 60 psi; and minimum screw holding capacity of 225 lbs. on faces and 200 lbs. on edges.

B. Plastic Laminate: NEMA LD-3, of thickness, type and grade designation indicated; in colors or patterns and finishes indicated or, if not indicated, as selected by Architect from manufacturer's standard range.

C. Exposed Surfacing Material of Doors, Drawer Fronts, Fixed Panels, Toeboards and Ends: High pressure decorative laminate, 0.028" thick, General Purpose Type (GP-28).

D. Semi-Exposed Surfacing Material and Doors: High pressure plastic laminate, 0.020" thick, Cabinet Liner Type (CL-20), in color or pattern and finish matching interior of cabinets, unless otherwise indicated.

E. Remaining Semi-Exposed Materials: Decorative boards, General Purpose type, conforming to NEMA LQ-1 with decorative faces in patterns or colors and finish indicated or, if not indicated, as selected by Architect from manufacturer's standard range.

F. Concealed Materials: Any sound dry solid lumber, plywood or particleboard or combination thereof; without defects affecting strength, utility or stability. On concealed surfaces of portions constructed of decorative boards, provide decorative or cabinet liner laminate backing (Light-Duty Type).

G. Core Material for Plastic Laminates: Industrial Grade Particleboard conforming to ANSI A20B.1, Grade 1-M-2.

H. Treatment of Exposed and Semi-Exposed Edges: Edges of doors and drawer fronts shall have GP-28 plastic laminate to match fronts.

I. Cabinet Construction

1. Sides, dividers, tops, bottoms, shelves and stretchers: Not less than 1/2" thick. Provide stretchers at top of base cabinet.

2. Backs: Not less than 3/8" thick for unexposed backs. Exposed backs are to be 3/4" thick panels of balanced construction tenoned into cabinet ends.

3. Drawers

    a. Sides, subfronts and backs: not less than1/2" thick.

    b. bottoms: not less than 1/4" thick particleboard or provide solid wood sides and back.

    c. Provide box type construction with front, bottom and back rabbeted in sides.

    d. All joints secured with glue and mechanical fasteners.

    e. All drawers must be suspended on extension drawer slides.

4. Joinery

    a. Rabbet backs flush into end panels and secure with concealed mechanical fasteners.

    b. Connect wall cabinet tops and bottoms and base cabinet bottoms and stretchers to ends and dividers by means of mechanical fasteners.

    c. Rabbet tops, bottom and backs into end panels or cabinetry corner joints to incorporate fluted dowel pin construction.

5. Subbase: Not less than 3/4" thick, of height and relationship to cabinet fronts and exposed ends as indicated. Subbase and Toe board are to be constructed with Plastic Laminate face per finish material schedule and elevations on drawings.

6. Toe Board: Not less than 3/4" thick, attached to subbase with concealed fasteners.

2.03 COUNTERTOPS

A. Exposed Surfacing Material: High pressure plastic laminate, 0.050" thick, General Purpose Type (GP-50); except 0.042" thick, Postforming Type (PF-42), where postformed coutertop configuration is indicated.

B. Substrate (Core) for Exposed Surfacing Material: Partcleboard.

C. Countertop Configuration: Provide self-edge countertops with continuous 4" backsplash.

D. Countertop Thickness: As indicated or, if not indicated, not less than 1-1/4" thick, and unless otherwise indicated, with substrate (core) not less than 3/4" thick.

2.04 CABINET AND CASEWORK HARDWARE AND ACCESSORIES

A. General: Provide manufacturer's standard hardware and accessory units of type, size and finish indicated, complying with ANSI A156.9 or, if not indicated, as selected by Architect from manufacturer's standard range.

B. Hinge: Institutional type, 5 knuckle with 270 degree swing. Provide one pair for doors less than 4 ft. high and 1-1/2 pair for doors over 4 ft.

C. Pulls: See hardware schedule and elevations on drawings for more information and specification. Provide 2 pulls for drawers over 24" wide.

D. Door Catches: Nylon roller spring catch or dual self-aligning permanent magnet type. Provide 2 catches on doors over 4 ft. high.

E. Drawer Slides: Steel slides with ballbearing nylon rollers. 100# rating. File drawers shall have full extension drawer slides for full access to drawer.

F. Drawer and Cupboard Locks: Half-mortise type, 5-disc tumbler and dead bolt, round cylinder only exposed, die cast with plated finish.

1. Key each cabinet in room alike.
2. Key each room differently.
3. Provide one master key.
4. Provide two keys each.

G. Sliding Door Hardware Sets: Manufacturer's standard to suit type and size of sliding door units.

H. Shelf Support Clips: One-piece molded nylon.

I. Sinks and Faucets: As specified in Division 22.

J. Finish: See hardware schedule and elevations on drawings for more information and specification.

2.05 FABRICATION

A. Shop assemble casework for delivery to site in unit easily handled and to permit passage through building openings.

B. Fabricate corners and joints without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.

C. Fabricate each unit rigid, not dependent on building structure adjacent units for rigidity.

D. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

E. Form edges smooth. Form material for counter tops, facing, shelves, and linings from continuous sheets.

F. Provide cutouts for plumbing fixtures, appliances, fixtures and fittings. Prime paint contact surfaces of cut edges.

G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 FINISHES

A. Exposed To View Surfaces: Plastic Laminate of color and pattern as selected.

B. Interior Surfaces: Plastic Laminate of color and pattern as selected.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify existing conditions.

B. Verify adequacy of support framing.

3.02 INSTALLATION

A. Install casework, components and accessories in accordance with manufacturer's instruction.

B. Use anchoring devices to suit conditions and substrate materials encountered.

C. Set casework items plumb and square, securely anchored to building structure.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Use filler strips not additional overlay trim for this purpose.

E. Close ends of units, back splashes, shelves and bases.

F. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3.03 ADJUSTING

A. Adjust work under provisions of Section 017700.

B. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly and doors and drawers to be square and true.

3.04 CLEANING

A. Clean work under provisions of 017700.

B. Clean casework, counters, shelves and hardware.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 017700.

B. Do not permit finished casework to be exposed to continued construction activity.

3.06 SCHEDULES

A. See Plans and Details.

END OF SECTION 123216

SECTION 123653 – SOLID SURFACE FABRICATIONS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following horizontal and trim solid surface product types:

1. Countertops with sinks
2. Lavatory tops with undermount bowls
3. Lavatory tops with integral bowls
4. Vanity tops
5. Bar tops
6. Windowsills
7. Thermoforming
8. Cove backsplashes

B. Related Sections include the following:

1. Division 05 Section “Metal Fabrications” for Blocking.
2. Division 06 Section “Rough Carpentry” for Blocking.
3. Division 09 Section “Wall Cladding.”
4. Division 10 Section “Toilet Partitions.”
5. Division 21 Section “Plumbing Fixtures.”
6. Division 26 Section “Wiring Devices.”

C. Alternates:

1. Refer to Division 01 Section “Alternates” for description of work in this Section affected by alternates.

1.03 DEFINITION

A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.04 SUBMITTALS

A. Product data:

1. For each type of product indicated.
2. Product data for the following:
    a. Chemical-resistant tops

B. Shop drawings:

1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.

a. Show full-size details, edge details, thermoforming requirements, attachments, etc.

b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.

c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

C. Samples:

1. For each type of product indicated.

a. Submit minimum 6-inch by 6-inch samples in specified gloss.

b. Cut sample and seam together for representation of inconspicuous seam.

c. Indicate full range of color and pattern variation.

2. Approved samples will be retained as a standard for work.

D. Product data:

1. Indicate product description, fabrication information and compliance with specified performance requirements.

E. LEED submittals:

1. Credit EQ 4.1:

a. Manufacturer's product data for installation adhesives, including printed statement of VOC content and material safety data sheets.

2. Credits MR 5.1:

a. Product data indicating that materials are regionally manufactured and within 500 miles of the project site.

F. Product certificates:

1. For each type of product, signed by product manufacturer.

G. Fabricator/installer qualifications:

1. Provide copy of certification number.

H. Manufacturer certificates:

1. Signed by manufacturers certifying that they comply with requirements.

I. NSF/ANSI standards:

1. Refer to www.nsf.org for the latest compliance to NSF/ANSI Standard 51 for food zone — all food types.

J. Maintenance data:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.

a. Maintenance kit for finishes shall be submitted.

2. Include in project closeout documents.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:
   1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:
   1. Standards of the following, as referenced herein:
      a. American National Standards Institute (ANSI)
      b. American Society for Testing and Materials (ASTM)
      c. National Electrical Manufacturers Association (NEMA)
      d. NSF International
   2. Fire test response characteristics:
      a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
         1) Flame Spread Index: 25 or less.
         2) Smoke Developed Index: 450 or less.

D. Coordination drawings:
   1. Shall be prepared indicating:
      a. Plumbing work.
      b. Electrical work.
      c. Miscellaneous steel for the general work.
      d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.
   2. Content:
      a. Project-specific information, drawn accurately to scale.
      b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
      c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
      d. Provide alternate sketches to designer for resolution of such conflicts.
         1) Minor dimension changes and difficult installations will not be considered changes to the contract.

E. Drawings shall:
   1. Be produced in 1/2-inch scale for all fabricated items.

F. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
   1. No review or approval will be forthcoming.

2. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

G. Pre-installation conference:

1. Conduct conference at project site to comply with requirements in Division 1.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver no components to project site until areas are ready for installation.

B. Store components, per manufacturer's recommendations, indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.

1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.07 WARRANTY

A. Provide manufacturer's warranty against defects in materials.

1. Warranty shall provide material and labor to repair or replace defective materials.

2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

B. Optional Installed Warranty:

1. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a DuPont Certified Fabrication/Installation source who will provide a brand plate for the application.

2. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.

C. Manufacturer's warranty period:

1. Ten years from date of substantial completion.

1.08 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:

1. Subject to compliance with requirements, provide products by one of the following:

a. Corian® surfaces from the DuPont company (basis of design).

b. All others must submit prior to Bidding for approval

2.02 MATERIALS

A. Solid polymer components

1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

B. Thickness:

1. 1/2 inch
2. 3/4 inch

C. Edge treatment:

1. 1/4 inch round edge

D. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10^{-6} psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10^{-6} psi	ASTM D 790
Hardness	>85 Rockwell “M” Scale 56 Barcol Impressor	ASTM D 785 ASTM D 2583
Thermal Expansion	1.80 x 10^{-5} in./in./°F	ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G21&G22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact	0.28 ft.-lbs./in. of notch (Notched Specimen)	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—½ lb. ball: ¼" slab—36" drop ½" slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	ΔE^*_{94}<5 in 1,000 hrs.	ASTM G 155
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test (“LC50”Test)
Flammability Flame Spread Index Smoke Developed Index	All colors (Class I and Class A) <25 <25	ASTM E 84, NFPA 255 & UL723

Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories. NEMA results based on the NEMA LD 3-2000

2.03 ACCESSORIES

A. Joint adhesive:

1. Manufacturer’s standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:

1. Manufacturer’s standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

2.04 FACTORY FABRICATION

A. Shop assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.
2. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints.
    a. Reinforce with strip of solid polymer material, 2" wide.
3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
4. Rout and finish component edges with clean, sharp returns.
    a. Rout cutouts, radii and contours to template.
    b. Smooth edges.
    c. Repair or reject defective and inaccurate work.

B. Thermoforming:

1. Comply with manufacturer’s data.
2. Heat entire component.
    a. Material shall be uniform, between 275 and 325 degrees Fahrenheit during forming.
3. Form pieces to shape prior to seaming and joining.
4. Cut pieces to finished dimensions.
5. Sand edges and remove nicks and scratches.

2.05 FINISHES

A. Color and pattern as shown in drawings (selected from Manufacturer’s standard color chart):

B. Finish:

1. Provide surfaces with a uniform finish.
    a. Matte; gloss range of 5–20.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1. Provide product in the largest pieces available.

2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Exposed joints/seams shall not be allowed.
3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
4. Cut and finish component edges with clean, sharp returns.
5. Rout radii and contours to template.
6. Anchor securely to base cabinets or other supports.
7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

B. Coved backsplashes and applied sidesplashes:

1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.
2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.
3. Adhere to countertops using manufacturer's standard color-matched Joint Adhesive.

3.03 REPAIR

A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

3.04 CLEANING AND PROTECTION

A. Keep components clean during installation.

B. Remove adhesives, sealants and other stains.

END OF SECTION 123653

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SECTION 123661 – QUARTZ COUNTER TOPS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Quartz surfacing for:

1. Countertops.
2. Other interior applications as shown on Drawings.

B. Related Sections:

1. Section 062000 – Finish Carpentry: Provide framing and blocking to support quartz surfacing within specified tolerances and in accordance with manufacturer's instructions.
2. Section 079200 - Joint Sealers: Sealers between quartz surfacing and work of other Sections
3. Templates showing cutouts required for installation of items installed on or penetrating through quartz surfacing shall be provided under Sections where items are specified.

1.02 REFERENCES

A. ASTM International:

1. ASTM C97 – Absorption and Bulk Specific Gravity of Dimension Stone.
2. ASTM C99 – Modulus of Rupture of Dimension Stone.
3. ASTM C170 – Compressive Strength of Dimension Stone.
4. ASTM C217 – Weather Resistance of Slate.
5. ASTM C482 – Bond Strength of Ceramic Tile to Portland Cement.
6. ASTM C484 – Thermal Shock Resistance of Glazed Ceramic Tile.
7. ASTM C501 – Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
8. ASTM C531 – Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
9. ASTM C880 – Flexural Strength of Dimension Stone.
10. ASTM C1028 – Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
11. ASTM D256 – Izod Pendulum Impact Resistance of Plastics.
12. ASTM D2047 – Static Coefficient of Friction of Polish-Coated Floor Surfaces by the James Machine.
13. ASTM D2299 – Relative Stain Resistance of Plastics.
14. ASTM E84 – Surface Burning Characteristics of Building Materials.

B. International Organization for Standardization:

1. ISO 9002 – Quality systems -- Model for Quality Assurance in Production, Installation and Servicing.
2. ISO 14001 – Environmental Management Systems
3. NSF

1.03 SUBMITTALS

A. Product Data:

1. Quartz Surfacing: Submit manufacturer's product data, and fabrication and installation instructions.

2. Accessories: Submit manufacturer's product data and installation instructions.

B. Shop Drawings: Show field-verified dimensions, quartz surfacing dimensions, locations and dimensions of cutouts, required locations of support and blocking members, edge profiles, and installation details and methods. Identify color[s] and finish[es].

C. Samples:

1. Samples for Color Selection: Submit two sets of manufacturer's standard colors and finishes.

2. Samples for Color Approval: Submit two samples 10 x 10 inches (250 x 250 mm) of each color and finish selected.

3. Stone Adhesive: Submit two samples of an adhesive joint for each color quartz surfacing selected. Show color match of adhesive.

D. Fabricator Qualifications: Submit evidence of fabricator's qualifications.

E. Closeout Submittals: Submit completed warranty form.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Packaging, Shipping, Handling, and Unloading: Observe manufacturer's recommendations and handle in manner to prevent breakage or damage. Brace parts if necessary. Transport in the near-vertical position with finished face toward finished face. Do not allow finished surfaces to rub during shipping or handling.

B. Storage and Protection: Store in racks in near-vertical position. Prevent warpage and breakage. Store inside away from direct exposure to sun. Store between 25 and 130 ºF (-4 and 54 ºC). Store with finished face toward finished face.

1.05 WARRANTY

A. Provide a manufacturer's ten-year limited warranty against product defects when installed by a certified fabricator.

PART 2 – PRODUCT

2.01 MANUFACTURERS

A. Qualifications: Manufacturer shall be ISO 9002 and ISO 14001 certified.

B. Acceptable Manufacturer: Provide CaesarStone Quartz Surfacing distributed by U.S. Quartz Products Inc (CaesarStone U.S.A., Inc.); Van Nuys, CA; phone 877-9-QUARTZ; www.caesarstoneus.com.

C. Acceptable Manufacturer: One Quartz Surface distributed by Daltile; website: https://www.daltile.com/

2.02 QUARTZ SURFACING

A. Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process. Material can fabricated in larger sized pieces due to its superior flexural strength compared to natural stone. This may reduce the number of joints in an installation and permit more economical and better looking jobs.

B. Dimensions:

1. Thickness: Nominal 1-1/4 inches (30 mm) As shown on Drawings.
2. Size: Slabs shall be not less than 56.5 x 120 inches (1.44 x 3.05 m) to minimize number of joints in installation. The back of each slab shall be imprinted with a trademarked zigzag pattern to simplify jobsite identification.

C. Identification: Material shall be labeled with batch number and imprinted on back with manufacturer's identifying mark.

D. Performance:

1. Flexural Strength: 7,420 psi, ASTM C880.
2. Compressive Strength: ASTM C-170
   a. Dry: 10,430 psi average.
   b. Wet: 11,265 psi average.
3. Izod Impact Strength: 0.361ft. lbs./inch of notch average; ASTM D256.
4. Bond Strength: 205 psi; ASTM C482 modified.
5. Modulus of Rupture: 2,110 average, ASTM C99.
6. Mohs Hardness: 6.5-7.5; scratch test.
7. Absorption: 0.022%; ASTM C97.
8. Stain and Acid Resistance: Not affected; ASTM D2299.
9. Surface Burning Characteristics: Flame spread = 10, smoke density = 195; ASTM E84.
10. Thermal Shock Resistance: Passes 5 cycles, 75°F-295°F; ASTM C484.
11. Coefficient of Thermal Expansion: 1.36x10 inch per °F.; ASTM C531.
12. Weathering Resistance: Not affected after seven days in 1% sulfuric acid; ASTM C217.
13. Freeze-Thaw Resistance: No visible damage or discoloration after 25 cycles (-45°C to 23°C); S.L.P. with ASTM C62 as guide.
14. Wear Resistance: 36.12 gram average; ASTM C501, tested with 1 kg. load, 1000 cycles at 70 r.p.m. The static coefficient of friction, below, is important for traffic-bearing surfaces and can be deleted when specifying other applications.
15. Static Coefficient of Friction:
    a. Polished Finish: 0.68 average by ASTM D2047, James Machine; 0.87 average (dry) and 0.54 average (wet) by ASTM C1028, Dynamometer Pull Method.
    b. Honed Finish: 0.69 average by ASTM D2047, James Machine; 0.73 average (dry) and 0.68 average (wet) by ASTM C1028, Dynamometer Pull Method.

E. Color and Finish:

1. Provide color and finish selected by Architect, see Finish Material Legend and finish drawings for more information.

F. Exposed Edges and Corners:

1. Countertops:
   a. Edges: Square

2.03 ACCESSORIES

A. Mounting Adhesives:

1. Provide structural-grade silicone or epoxy adhesives of type recommended by manufacturer for application and conditions of use.
2. Acceptable Silicone Manufactures:
    a. Dow Corning.
    b. GE Sealants and Adhesives.
3. Acceptable Epoxy Manufacturers:
    a. Akemi North America.
    b. Bonstone Material Corporation.
    c. Tenax USA.
4. Provide spacers, if required, of type recommended by adhesive manufacturer.

B. Stone Adhesive:
1. Provide epoxy or polyester adhesive of type recommend by manufacturer for application and conditions of use.
2. Acceptable Manufacturers:
    a. Akemi North America.
    b. Bonstone Material Corporation.
    c. Tenax USA.
3. Color: Adhesive which will be visible in finished work shall be tinted to match quartz surfacing. In most countertop and interior cladding applications, CaesarStone can be installed with structural adhesive. Where required, however, CaesarStone can also be set in grout or installed with ties, clips, or other types of hardware recommended for thin stone veneers. Edit below and coordinate Section as required.
4. Clear silicone sealant of type recommended by manufacturer for application and conditions of use.
5. Provide anti-bacterial type in food preparation areas,
6. Acceptable Manufactures:
    a. Dow Corning.
    b. GE Sealants and Adhesives.

D. Solvent: Product recommended by adhesive manufacturer to clean surface of quartz surfacing to assure adhesion of adhesives [and sealants].

E. Cleaning Agents: Non-abrasive, soft-scrub type kitchen cleansers.

2.04 FABRICATION

A. Fabricator: Firm shall have five years experience fabricating architectural stone and shall have water-cooled cutting tools. Firm shall be authorized in writing by manufacturer.

B. Shop Assembly: Observe proper safety procedures and comply with manufacturer’s instructions.

C. Layout: Layout joints to minimize joints and to avoid L-shaped pieces of quartz surfacing.

D. Inspect Material:
1. Inspect material for defects prior to fabrication.

2. Color Match: Materials throughout Project shall be from the same batch and shall bear labels with same batch number. Visually inspect materials to be used for adjacent pieces to assure acceptable color match. Inspect in lighting conditions similar to those on Project.
3. Variation in distribution of aggregates in quartz surfacing which are within manufacturer's tolerances is not a defect.

E. Tools: Cut and polish with water-cooled power tools.

F. Cutouts:

1. Cutouts shall have 3/8 inches (10 mm) minimum inside corner radius. Inside corners shall be reinforced in an acceptable manner to prevent cracking.
2. Where edges of cutout will be exposed in finished work, polish edges.
3. If the remaining material outside a cutout is less than three inches (76 mm) inches wide, reinforce area by laminating it with a strip of quartz surfacing.

G. Laminations: Laminate layers of quartz surfacing as required to create built-up edges.

PART 3 – EXECUTION

3.01 ACCEPTABLE INSTALLER

A. Installer: Firm shall have five years experience installing architectural stone.

3.02 EXAMINATION

A. Site Verification:

1. Verify dimensions by field measurements prior to fabrication.
2. Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/16 inch in ten feet (1.6 mm in 3000 mm) and that necessary supports and blocking are in place.
3. Base Cabinets: Cabinet units shall be securely fixed to adjoining units and back wall.

B. Inspect finished surfaces for damage. Do not install until damage materials have been repaired in an acceptable manner or replaced.

3.03 PREPARATION

A. Protect finished surfaces against scratches. Apply masking where necessary. Guard against grit, dust, and other trades.

3.04 INSTALLATION

A. Install materials in accordance to manufacturer's recommendations. Lift and place to avoid breakage.

B. Preliminary Installation and Adjustment: Position materials to verify that materials are correctly sized and prepared. Make necessary adjustments.

1. If jobsite cutting, grinding, or polishing is required, use water-cooled tools. Protect jobsite and surfaces against dust and water. Perform work away from installation site if possible.
2. Countertops: Gypsum drywall back walls which are not fire or acoustically rated may be routed up to half the thickness of the drywall to allow countertop to fit.
3. Allow gaps for expansion of not less than 1/16 inch (1.5 mm) per five feet when installed between walls or other fixed conditions.
4. Drainage: Adjacent to sinks and where drainage is required, shim countertops slightly to insure positive drainage.

C. Permanent Installation:

1. After verifying fit, remove quartz surfacing from position, clean substrates of dust and contamination, and clean quartz surfacing back side and joints with solvent.
2. Apply sufficient quantity of mounting adhesive in accordance with adhesive manufacturer's recommendations to provide permanent, secure installation.

D. Joints:

1. Joints Between Adjacent Pieces of Quartz Surfacing:
   a. Joints shall be flush, tight fitting, level, and neat.
   b. Securely join with stone adhesive. Fill joints level with quartz surfacing.
   c. Clamp or brace quartz surfacing in position until adhesive sets.

3.05 REPAIR

A. Repair or replace damaged materials in a satisfactory manner.

3.06 CLEANING

A. Remove masking and excess adhesives and sealants. Clean exposed surfaces.

3.07 PROTECTION

A. Protect surfacing from damage by other Sections.

END OF SECTION 123661

SECTION 126600 – TELESCOPING STANDS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Manufacture, deliver and install Telescopic Seating Systems in accordance with applicable codes, the following specifications, and approved drawings.

1.02 RELATED WORK BY OTHERS

A. Adequate floor levelness and strength for operation of telescopic seating.

B. Adequate wall strength for attachment and operation of wall attached telescopic seating.

C. Electrical wiring within the building as required for power operated telescopic seating.

1.03 SYSTEM DESCRIPTION

A. Telescopic seating system shall be multiple tiered seating rows comprised of seat and deck components, risers, and supportive understructure.

B. Telescopic seating shall be operable on the telescopic principle, stacking vertically in minimum floor area when not in use.

C. The first moving row, on manual sections, shall be secured with release lever. All other rows shall be mechanically locked, operable only upon unlocking and cycling of first row. Power sections shall be secured with mechanical locks as well as the power system, operable upon activating the pendant control.

1.04 QUALITY ASSURANCE

A. DESIGN LOAD CRITERIA (STRUCTURAL): International Building Code Standard: Comply with requirements of IBC / ICC 300, Chapter 4 "Standard for Bleachers, Folding and Telescopic Seating and Grandstands Assembly Seating," except where other requirements are indicated by the architect/owner.

B. Partial Loading Requirements: Telescopic seating governed by IBC 2018, ICC-300 2017, NFPA 102 2016 or NFPA 5000 2018 shall all comply with ASCE 2016, Section 4.3.3 Partial Loading.

C. Manufacturer: Company specializing in telescopic seating with a minimum of 25 years' experience in manufacturing telescopic seating.

D. Engineer Qualifications: Manufacturer to employ a registered, licensed Professional Engineer to certify that the equipment to be supplied meets or exceeds the design criteria of this specification.

E. Installation: Shall be handled directly by the manufacturer or by a factory certified installation subcontractor.

F. Product Liability: Certification of insurance coverage of not less than $5,000,000.

G. Welding Processes: To be performed by certified professional welding operators in accordance with American Welding Society – Certified Welding Fabricator, (AWS-CWF), D1,1 "Structural Welding Code-Steel."

H. Product Improvements: Equipment provided shall incorporate manufacturer's design improvements and materials current at time of shipment, provided that such improvements and materials are consistent with the intent of these specifications.

1.05 SUBMITTALS

A. BID SUBMITTALS

1. Manufacturer's descriptive literature and specifications.
2. List of deviations from these specifications, if any.
3. Certification of Insurance.

B. JOB SUBMITTALS

1. Shop Drawings showing all equipment to be furnished with details of accessories to be supplied including necessary electrical service to be provided by others. All electrical submittals must include U.L. listing number.
2. Samples of material and color finish as requested by Architect.
3. Warranty, operation and maintenance instructions to the owner upon completion.

1.06 DESIGN CRITERIA

A. Telescopic seating shall be designed to support, in addition to its own weight, and the weight of added accessories, a uniformly distributed live load of not less than 100 lbs. per sq. ft. (4.8 kN per sq. m.) of gross horizontal projection. Seat boards and footrest shall be designed for a live load of not less than 120 lbs. per linear foot (1.751 kN per linear m).

B. Sway force applied to seats shall be 24 lbs. per linear ft. (350 N per linear m.) parallel to the seats and 10 lbs. per linear ft. (146 N per linear m.) perpendicular to the seats. Sway forces shall not be considered simultaneously applied.

C. Railings, posts and sockets designed to withstand the following forces applied separately.

D. Handrails shall be designed and constructed for:

1. A concentrated load of 200 lbs. (890 N) applied at any point and in any direction.
2. A uniform load of 50 lbs. per ft. (730 N/m) applied in any direction. The concentrated and uniform loading conditions shall not be required to be applied simultaneously.

E. Guards shall be designed and constructed for:

1. A concentrated load of 200 lbs. (890 N/m) applied at any point and in any direction along the top railing member and; a uniform load of 50 lbs. per ft. (730 N/m) applied horizontally at the required guardrail height and simultaneous uniform load of 100 lbs. per ft. (1460 N/m) applied vertically downward at the top of the guardrail. The concentrated and uniform loading conditions shall not be required to be applied simultaneously.

F. American Institute of Steel Construction (AISC), American Iron and Steel Institute (AISI) and Aluminum Association (AA) design criteria shall be the basis for calculation of member sizes and connections.

G. Wood members shall be designed in accordance with National Forest Products Association, (NFOPA), and National Design Specification for Wood Construction.

1.07 WARRANTY

A. The manufacturer shall warrant all work performed under these specifications to be free of defects for a period of one year.

B. All understructure components shall be warranted for a period of ten years.

C. Any materials found to be defective within this period will be replaced at no cost to the owner. This warranty shall not include replacements required by Acts of God, war, vandalism, flood, fire, calamity or deliberate abuse or misuse of the equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All seating shall be VersaTract Telescopic Seating System as manufactured by Irwin Seating Company - Telescopic Division, Altamont, IL 62411 or equal, subject to prior approval and strict compliance with these specifications.

2.02 MATERIALS

A. Seating Area:_____Groups_____Feet ____Inches Long, _____Rows High

1. Wall Attached and Electrically Operated system

B. Dimensions:

1. Overall height:_____Feet_____Inches
2. Open depth:_____Feet_____ Inches
3. Closed depth:_____Feet_____ Inches
4. Row Spacing: _____36 Inches
5. Rise per row: _____ Inches

2.03 FABRICATION

A. Understructure System:

1. Steel supports and rolling frames shall be constructed from formed steel of the size and shape necessary to support the design loads. All support bracing shall begin at Row 2 and be of diagonal or "knee" type for rigidity. Diagonal bracing to be minimum 1-1/2” x 1-1/2" 14-gauge square tubing. Bracing fabricated from open-sided channel, angle iron or flat strap "X" type bracing is unacceptable.
2. Wheels shall not be less than 5" diameter x 1-3/8" non-marring soft rubber face to protect wood or synthetic floor surfaces. Each operating row shall have a minimum of 6 wheels.
3. Each fully skirted wheel channel shall be formed 12-gauge steel and continuously in contact with adjacent channels by means of an Integral Alignment System (IAS) and include nylon glides to eliminate any metal to metal contact. The IAS maintains proper alignment between adjacent wheel channels for smooth and consistent operation while eliminating the potential for accidental row separation. Wheel channel alignment systems with metal to metal contact requiring periodic lubrication or that utilizes a guide rod system that can be bent or damaged will not be acceptable.
4. Each cantilever arm shall be triple-formed 10-gauge steel, securely welded to the post assembly and include a nylon cantilever pad to ensure smooth operation. The cantilever pad shall also provide a firm base when in the occupied position and provide a solid feel when walked on.
5. Vertical columns shall be high tensile steel structural tube to meet design criteria. Minimum column size to be 2” x 3” 14-gauge structural tube, welded to a 2’ wide wheel channel using 360 degrees of weldment.
6. Deck support members shall be double formed 14-gauge steel and connect the front nosing and rear riser members. Each deck support shall include a unique dual-purpose roller that provides smooth support during operation. The deck support roller shall also include a 3/4” wide shoulder that’s encapsulated by the deck support on the row above in order to maintain proper upper alignment while delivering consistent, repeatable operation.

B. Seat Systems:

1. Integra Chair: Supply fold-down chairs on telescoping platforms with seats, backs, and a full complement of standards, fold-down mechanism and all support structure required for a fully functional seating system.
    a. Platform chairs shall have a modern look with complementary style lines, comfortable contours and subtle texture to achieve maximum spectator comfort.
    b. Each chair to be constructed from durable, scuff resistant injection molded high density polypropylene plastic, designed to support over 700 pounds per chair.
    c. Seat heights shall be maintained at a minimum of 17-1/2". Lower seat heights which detour from spectator comfort will not be accepted.
    d. Actual seat width shall not be less than 17-1/4”.
    e. Back heights to be a minimum of 31-1/2" and designed to fold within the depth of the deck when in the stored position. Chairs extending beyond the face of the unit when closed will not be acceptable.
    f. Chairs shall be rail mounted and allow for complete flexibility in chair layout. Seat spacing to be available from 18” to 24”, and field adjustable.
    g. Each chair shall have the capability of using seat numbers and row letters at the aisle locations. Seat numbers and row letters to have a stylish round design to enhance the aesthetic value of the seat, and be recessed to protect against vandalism.
    h. Select seating colors from manufacturer’s 15 standard colors. Custom colors available as an option.
    i. Securely fasten each chair and arm assembly to a heavy-duty, black anodized aluminum rail using locking hardware.
2. Chair Fold-Down System:
    a. Semi-Automatic Operation with Foot Release: The raising and lowering of up to 12 chairs per operation shall be accomplished with an internal spring assist system. Locking of chairs in the use position shall be totally independent of platform operation. Lowering of each row of chairs shall be done by simply depressing a foot release lever allowing the chairs to fold flat on the deck surface. Locking and hinge system shall be shrouded over their total length to simplify cleaning and prevent debris from interfering with the latching mechanism.
3. Chair Type:
    a. Upholstered Seats and Backs: Seat and back shall include upholstered padding that maximizes overall chair comfort and aesthetics. For proper comfort, seats and backs shall be a minimum of 17-1/4” wide. Narrower seats which sacrifice spectator comfort will not be acceptable. Upholstery culls shall be foam wrapped with the seat to receive 1” of foam and 5/8” in the back. Foam material shall be of new (prime manufacture) polyurethane foam, and comply with the flammability requirements outlined in California Technical Information Bulletin #117, Resilient Cellular materials, Section A & D, dated February 1975, when tested in accordance with Federal Test Method Standard 191, Method 5903.2. Fabric shall be supplied as specified by Architect / Owner, or selected from manufacturer’s standard.
4. Armrest Type:
    a. Tablet Arm: Supply Scribe folding tablet arm in accordance with these specifications and the architect’s plans. Tablet arms shall operate independent of the chair with the ability to be located on all or partial chairs and be available in right-handed model. Each chair must have a usable armrest while the tablet arm is in the non-use, stored position.

Tablet arm operation shall require only one movement to return to the stored position and be mechanically dampened to fold in a controlled manner. The writing surface shall be constructed of 1/2” thick molded thermoset resin, providing 124” of usable space, not including the forearm area.

5. Alternate Chair Proposal: Supply Decra Chair as an alternative bid.
    a. Platform chairs shall have a modern look with complementary style lines, comfortable contours and subtle texture to achieve maximum spectator comfort.
    b. Each chair to be constructed from finished wood veneer outer panel on the seat and back with upholstered pads.
    c. Wood veneer outer panels to be 1/2" thick finished material with 1-1/2” foam on the seat and 1” on the back for added comfort. Finished and fabric to be selected from manufacturers standard offering.
    d. Seat heights shall be maintained at a minimum of 17-1/2”. Lower seat heights which detour from spectator comfort will not be accepted.
    e. Back heights to be a minimum of 31-1/2” and designed to fold within the depth of the deck when in the stored position. Chairs extending beyond the face of the unit when closed will not be acceptable.
    f. Chairs shall be rail mounted and allow for complete flexibility in chair layout. Seat spacing to be available from 18” to 24”, and field adjustable.
    g. Each chair shall have the capability of using seat numbers and row letters at the aisle locations. Seat numbers and row letters to have a stylish round design to enhance the aesthetic value of the seat, and be recessed to protect against vandalism.
    h. Securely fasten each chair and arm assembly to a heavy-duty, black anodized aluminum rail using locking hardware.

C. Deck System:
    1. Carpeted decking shall be supplied using 26 oz. commercial grade, low level, looped olefin fiber carpet with low maintenance polypropylene backing. Carpet to be applied over carpet 3/4" grade plywood. Color to be selected from manufacturer’s standard.

D. Nosing shall be one piece, formed, 14-gauge steel with a black powder coated epoxy finish.

E. Rear riser shall be one piece, formed, 14-gauge steel with a black powder coated epoxy finish.

F. Chair rail to be extruded structural aluminum with a black anodized finish.

G. For rust resistance in standard conditions all painted surfaces shall be finished in textured Epoxy Powder Coated Semi-Gloss Black.

2.04 ACCESSORIES

A. Aisles shall be footrest level _____inches wide to provide _____ aisles. Aisles at the footrest level shall include non-slip treads on the top front edge.

B. Intermediate aisle steps shall be provided. Steps are permanently attached closed design. Steps shall be constructed from 14 ga. steel, finished in a Black powder coated epoxy, and designed to eliminate any possible toe catch between the top of the intermediate step and the bottom of the nose beam per ADA or other applicable codes. Front step shall be removable and interlock to the front row eliminating any possibility of accidental disengagement, and store on the front row when not in use.

C. Aisle handrails:

1. Smart Rail EX aisle handrails shall be provided for 28” to 36” row spacing. Aisle railings shall quickly and easily rotate 90 degrees to the locked position and store parallel to the front of the aisle. Railings that require removal from the pocket or the use of tools for storage will not be acceptable. Aisle railings shall be an individual rail design, located on every other row starting at row two (2). Railing to be constructed of 1 1/2” 11 ga. round steel tubing, finished in a textured powder coated epoxy. For safety, railings designed without a full return of the handrail will not be acceptable.

D. Seat numbers and row letters shall be supplied in a contrasting, but complementary color for easy seat identification. Layout of numbering to be coordinated with the architect/owner.

2.05 PROPULSION SYSTEM

A. FRICTION POWER: Integra Drive System (IDS) shall be furnished on each seating group to open and close the telescopic units. Each individual section shall include 2 IDS friction drive systems integrated into the first moving row of understructure to achieve smooth and efficient operation. Operation of the seating shall be accomplished with the use of a walk along pendant control.

1. Each IDS power system shall include large 6 1/2" diameter friction rollers to develop tractive force adequate to open and close the system. Each roller to include non-marring 1/2" thick rubber covering.

2. Electrical motors for each section shall be heavy-duty and high efficiency gear reduction motors. The shaft diameter for the gear motor and rollers shall be a minimum of 1” and be connected by a 1” schedule 40 drive shaft.

3. All roller chain and sprockets used throughout the drive system shall be a minimum of #40 in size. Each drive unit shall be designed to include a safety shroud around the chain and sprocket for overall safety.

4. The power units shall develop tractive forces adequate to operate the seating units under normal conditions but inadequate to operate should significant obstacles be encountered.

B. Manufacturer shall provide all wiring from power source within bleacher seating including pendant control. Removable pendant control shall be handheld with forward and reverse button, plugging into a single receptacle. Electrical contractor shall provide a 60 HZ power source (as specified below) behind each group of seating. Amperage to be as specified by seating manufacturer depending on the number of power units required. For wall-attached installations, power source to terminate in a surface mounted junction box above floor. For reverse units, power source to terminate in a junction box, flush mounted under first seating row in center of group. Electrical contractor shall perform the connections to the seating equipment at the junction box. All electrical parts and wiring shall be installed in complete accord with the National Electric Code. U.L. Listing FHJU.E479554. Supply power system with 208/230V, 5 wire 3-phase system.

PART 3 - EXECUTION

3.01 REVIEWS AND APPROVALS

A. Shop drawings shall be approved and job site field measurements taken prior to installation and telescopic gym seating shall be installed in conformance therewith.

3.2 INSTALLATION

A. The installation of the telescopic gym seating will be handled directly by the manufacturer or by a factory authorized installation subcontractor qualified to perform the installation function.

3.3 PROTECTION

A. The manufacturer’s representative shall transmit instructions in both operation and maintenance to the owner.

B. Maintenance and operation of the telescopic gym seating shall be the responsibility of the owner or his duly authorized representative, and shall include the following:

1. During operation of the telescopic gym seating, the opening and closing shall be supervised by responsible personnel who will assure that the operation is in accordance with the manufacturer's instructions.

2. Only attachments specifically approved by the manufacturer for the specific installation shall be attached to the telescopic gym seating.

3. An annual inspection and required maintenance of all telescopic gym seating shall be performed to assure safe conditions. At least bi-annually, the inspection shall be performed by a Professional Engineer or factory service personnel.

C. Irwin Telescopic Seating Company constantly strives to improve its product and manufacturing methods; therefore, it reserves the right to make changes without notice which, in the opinion of Irwin Seating Company, shall improve the product.

END OF SECTION 126600

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SECTION 140500 – BASIC ELEVATOR REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. All work except floor tile installation shall be done by licensed elevator companies as is required by law.

B. Contractor's employees shall be licensed as is required by law.

C. All work shall be done in accordance with A17.1-2007 edition and the Indiana Elevator Code.

D. All Contractors must be on a pre-approved list of bidders and have a minimum of 10 years of ongoing business within the State of Indiana. The following Elevator Contractors are pre-approved. All others must submit for approval.

1. Montgomery / KONE
2. Otis Elevator
3. ThyssenKrupp Elevator

E. NO "extra" work, additional chargers, or change orders shall be considered unless the Owner has provided the Contactor written authorization to proceed.

F. All materials required for the Project shall be stored off-site. Only those materials required for immediate installation will be allowed on campus.

G. The Contractor shall be responsible for all necessary permits and associated fees. The Contractor shall be responsible for scheduling all State Division of Elevator Safety Inspections.

H. The Owner will provide a phone line to the area of the elevator controller or as directed by the Contractor. The Contractor is responsible for the remainder of the wiring and device installation.

I. All materials required for the Project shall be stored off-site. Only those materials required for immediate installation will be allowed on campus

1.02 SCHEDULE OF WORK

A. For buildings with multiple elevators one elevator at a time is permitted to be modernized.

B. For buildings with one elevator all modernization work must occur during the summer months.

1.03 SUBMITTALS

A. The following items shall be submitted electronically in PDF format for approval prior to ordering.

1. Product Data.
2. Shop Drawings, including, car, hoistway and pit dimensions.
3. Electrical requirements.
4. Structural loading requirements.

1.04 PROJECT CLOSEOUT

A. Contractor shall submit one hard copy and one copy on CD in PDF Format of O & M information for each elevator renovated.

B. Required O & M information includes but not limited to the following:

1. Approved shop drawings
2. Maintenance information
3. Parts list
4. As Built wiring diagrams
5. Inspection Reports

1.05 PROJECT COORDINATION

A. Project Manager – Pat Teeters (812)-230-6141

B. Facilities Management contact for site visits – Pat Teeters (812)-230-6141

PART 2 – NOT USED

PART 3 – EXECUTION

3.01 SERVICE AND PREVENTATIVE MAINTENANCE CHECKS

A. For major modernizations of elevators the Contractor shall provide, in addition to warranty repairs, all routine service and twice monthly PM checks including all paperwork required to satisfy all applicable Elevator Codes.

B. The Owner will inform the Bidders prior to Bidding if this service is to be included in their Bid.

END OF SECTION 140500

SECTION 142125 – ELECTRIC TRACTION PASSENGER ELEVATORS (MACHINE ROOMLESS)

PART 1 – GENERAL

1.01 SUMMARY

A. Includes But Not Limited To

1. Electric traction elevator described in Contract Documents.
2. Securing variance and other required clearances from State and local authorities having jurisdiction including costs of filing and other fees.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Divisions 00 and 01, General Requirements, of these Specifications.
2. Division 03 - Concrete
3. Division 04 - Masonry
4. Division 05 - Metals
5. Division 07 - Thermal and Moisture Protection
6. Section 09 – Flooring for Elevator
7. Division 23 -HVAC
8. Division 26 -Electrical
9. Division 27 - Communications
10. Division 28 - Electronic Safety and Security

C. It is the responsibility of any firm preparing a proposal for the work of this Section to obtain all necessary bidding documentation for the complete elevator installation. No additional compensation will be granted due to not being fully appraised of all the requirements associated with a complete and proper elevator installation.

1.02 REFERENCES

A. American National Standards Institute

1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
2. ANSI/NFPA 70, National Electrical Code.
3. ANSI/NFPA 80, Fire Doors and Windows.
4. ANSI/UL 10B, Fire Tests of Door Assemblies.
5. ANSI A17.1, Safety Code for Elevators and Escalators.

B. ADAAG, Americans with Disabilities Act Accessibility Guidelines.

C. ASME A17.1 “Safety Code for Elevators and Escalators” (with Amendments adopted by the State of Indiana)

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Elevator Type - A/C gearless traction elevators with machine room-less application.
2. Stops & Openings -
   a) 5 stop (5 front 1 rear)
   b) Floor Markings - TBD
3. Rise – Field verify
4. Rated Capacity/Speed - 5000lbs. at 150 FPM
5. Clear Inside Dimensions: 6’ ½’” W x 8’ 4¾” D
6. Cab Height: 9’ 9”
7. Clear height under suspended ceiling: 8’ 11-3/4” (2813mm)
8. Entrance Type and Width: Two Speed Side Slide 54” W x 96” high
9. Main Power Supply - 208 Volts + or - 5% of normal, 3 Phase, with a separate equipment grounding conductor.
10. Lighting Power Supply - 120 Volts, 1 Phase, 15 Amp, 60 Hz.

B. Performance Requirements

1. Car Performance
   a) Car Speed - +/- 3% of contract speed under any loading condition or direction of travel.
   b) Car Capacity - Safely lower, stop, and hold at least 125% of rated load
2. System Performance
   a) Vertical Vibration (maximum) - 12 – 17 milli-g
   b) Horizontal Vibration (maximum) - 10 – 15 milli-g
   c) Vertical Jerk (maximum) - 3.3 - 5.6 ft./ sec^3
   d) Acceleration/Deceleration (maximum) - 1.6 - 2.9 ft./ sec^2
   e) In Car Noise - 55 dB(A) max
   f) Stopping Accuracy - ± 0.2 in.
   g) Re-leveling Distance - ± 0.4 in.

C. Provide equipment according to Seismic Zone 2

1.04 SUBMITTALS

A. See Section 013300
1. Note - All submittals are required to be job specific. Factory typical submittals and reproductions of contract documents will not be acceptable.

B. Product Data - Submit manufacturer’s product data for each system proposed for use. Include the following
1. Signal and operating fixtures, operating panels and indicators.
2. Cab design, dimensions and layout.
3. Hoistway door and frame details.
4. Electrical characteristics and connection requirements.
5. Indicate variations from specified requirements.

C. Shop Drawings - Submit approval layout drawings including the following -
1. Car, guide rails, buffers and other components in hoistway.
2. Maximum rail bracket spacing.

3. Maximum loads imposed on guide rails requiring load transfer to building structure.
4. Loads on hoisting mounting or beams.
5. Clearances and travel of car.
6. Clear inside hoistway and pit dimensions, tolerances
7. Location and sizes of access doors, hoistway entrances and frames.
8. Indicate ventilation for elevator control rooms and hoistways.
9. Wiring diagrams detailing locations and wiring for power, signal and control systems and differentiating between manufacturer-installed wiring and field-installed wiring. Indicate maximum and average power demands.

D. Operations and Maintenance Manuals

1. Furnish O & M submittals as detailed in Section 017700 Contract Closeout.
2. Required O & M information includes but is not limited to the following -
   a) Approved shop drawings
   b) Maintenance information with parts lists
   c) 'As Built' wiring diagrams
   d) Inspection and acceptance certificates and operating permits
   e) Copy of warranty

1.05 QUALITY ASSURANCE

A. Manufacturer - A firm ISO 9002 certified with a minimum of 10 years experience in fabrication of elevators equivalent to those specified.

B. Installer - Manufacturer or a factory authorized installer.

C. Regulatory Requirements

1. Elevator system design and installation shall comply with the latest versions of ASME A17.1
2. Elevator shall be designed in response to Americans with Disabilities Act Accessibility Guidelines (ADAAG).

D. Permits and Inspections

1. Provide licenses and permits and perform required inspections and tests.
2. Obtain required variances and other approvals required by State and local authorities having jurisdiction and submit copies to Owner.
3. Owner will sign applications for permit and compliance forms for submission to the State of Indiana by the elevator contractor.

E. Pre-installation Conference

1. Immediately after award of contract, schedule a pre-installation meeting with Owner, Architect, Contractor, elevator installer, masonry sub-contractor, electrical sub-contractor, and other trades involved in installation of elevator and elevator hoistway.
2. Review
   a) Schedules and critical target dates to assure appropriate completion, and the coordination of efforts of the various trades involved.
   b) Critical dimensions, tolerances, and other criteria
   c) Interface between elevator and access control system

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.

B. Store material, components, and equipment off of ground, under cover, and in a dry location.

C. Handle material, components, and equipment according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

D. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.

E. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the Prime Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.07 SCHEDULING

A. Schedule and execute the work of this Section so elevator is complete and operational in all respects as required by GC and Architect to permit the timely completion of the remaining portions of the work.

1.08 WARRANTY

A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one (1) year from the date of final elevator inspection by the Indiana Department of Homeland Security Elevator Division. The guarantee excludes: ordinary wear and tear or improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

1.09 MAINTENANCE SERVICE

A. Provide maintenance service consisting of regular examinations, adjustments and lubrication of the elevator equipment for the entire warranty period.

1. This service shall be performed by the elevator contractor.

2. All work shall be performed by competent employees on a 24/7 basis for the duration of the warranty period. Elevator contractor shall respond within 15 minutes during normal working hours and 30 minutes at all other times for all service calls.

3. Provide twice monthly preventive maintenance checks and monthly fireman's service testing. Maintain proper documentation in elevator control room.

4. At end of warranty period, turn over to owner all documentation associated with the installation and maintenance of the elevator and any service tools required for proper maintenance of the elevator.

5. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

B. The elevator control system must:

1. Provide on top of the car the necessary devices to run the elevator in inspection operation.

2. Provide in the control access cabinet an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
3. Provide in the event of a power outage, means from the control access cabinet to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
4. Provide the means from the control access cabinet to reset the governor over speed switch and also trip the governor.
5. Provide the means from the control access cabinet to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
6. Provide the means from the control access cabinet to reset elevator earthquake operation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis for this design is the Otis GEN 2 Underslung

B. Acceptable Manufacturers

1. Otis Elevator Company, Farmington CT www.otis.com

2.02 CONTROL COMPONENTS

A. Controller - Elevonic® Control Microcomputer based control system performing all of the functions of safe elevator operation. The system shall also perform car operational control.

1. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC)
2. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity”
3. Separate controller into two distinct halves; Motor Drive side and Control side. Route high voltage motor power conductors to be physically segregated from the rest of the controller.
4. Shield memory equipment from line pollution.
5. Controller shall be installed in the hoistway adjacent to top landing.
6. Provide a locked service access cabinet installed in the hoistway frame at the top landing. Cabinet door shall be further secured with a minimum of two (2) tamper resistant screws installed on side opposite the hinge. Service control cabinet shall contain the following:

a) Main Power disconnecting means
b) Behind a separate internal locked cabinet all controls necessary for operation of the elevator to provide access to the internal hoistway installed controller in an emergency situation.

B. Drive - Variable Voltage Variable Frequency AC drive system, regenerative.

2.03 HOISTWAY COMPONENTS

A. Machine

1. AC gearless machine
2. Synchronous permanent-magnet motor
3. Emergency disc brakes
4. Mounted on sidewall near top of the hoistway.

B. Controller mounted adjacent to top landing

C. Coated Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords.

D. Governor Rope: Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core center rated for the duty of the specified elevator

E. Buffers, Car and Counterweight - Compression spring type buffers shall be used.

F. Hoistway Operating Devices:

1. Emergency stop switch in the pit
2. Terminal stopping switches.
3. Emergency stop switch on the machine

G. Positioning System - Encoder, reader box, and door zone vanes.

H. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.

I. Fascia - Galvanized sheet steel, at the front of the hoistway.

2.04 HOISTWAY ENTRANCES

A. Frames

1. Bolted construction for complete one-piece unit assembly.
2. Securely fastened to fixing angles mounted in the hoistway
3. UL fire rated steel.
4. Provide additional sill angle support

B. Sills - Extruded aluminum.

C. Entrance Doors

1. Hollow metal construction with vertical internal channel reinforcements.
2. Fire Rating - UL fire rated for 1-1/2 hour.

D. Entrance Finish - Satin Stainless Steel Frames and Doors.

E. Entrance Markings

1. Mark entrance jambs with standard entrance jamb plates having raised floor markings with Braille adjacent.
2. Provide on both sides of the entrance.

2.05 CAR COMPONENTS

A. Car Frame - Fabricate car frame from formed or structural steel members with adequate bracing to support the platform and car enclosures.

B. Platform

1. All steel construction.
2. Aluminum threshold.
3. Mount load weighing devices under the platform.
4. Car platform to accommodate one-piece loads weighing up to 25% of the rated capacity, such as heavy furniture, wheeled carts, etc.

C. Car Safety - Securely attached to the car frame

D. Guides - Mount rubber roller guides on top and bottom of the car and counterweight.

E. Car Top - ½ inch thick structural wood material clad on both sides with a 1/32 inch natural finish aluminum panel, or 16 gauge steel with baked enamel finish.

F. Cab

1. Front Wall - 16 gauge minimum stainless sheet steel, Satin finish.
2. Side and Rear Walls - 16 gauge minimum sheet steel, painted color Real White.
3. Car Door Finish - Satin Stainless Steel finish.
4. Ceiling – Satin Stainless Steel with recessed LED downlights.
5. Flooring – carpet as specified by Architect. Provided and installed by Division 9 Contractor.
6. Handrail - Flat Solid Metal, 3/8” inch x 2 inch satin stainless steel provided on the sides and back of the car enclosure.
7. Bottom Protection Rail - Flat solid metal, 3/8” inch x 6 inch satin stainless steel provided on the sides and back of the car enclosure.
8. Threshold – Aluminum.
9. One (1) Set of Protective pad hooks and quilted fire retardant protective pads.
10. Emergency Exit Contact - Provide an electrical contact on the car-top exit.
11. Utility Outlet - 125V, 15 amperes utility outlet with ground-fault circuit-interrupter protection located in the cab.

G. Emergency Car Lighting - Provide sealed rechargeable battery and totally static circuits to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.

H. Emergency Car Signals

1. Mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged.
2. Siren pressure level - 80 dba at a distance of 3.0 m from the device.
3. Response time - A delay of not more than 1 second after the switch or push button has been pressed.

I. Exhaust Fan

1. Two-speed 120 VAC fan mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements.
2. Airflow rates - 5.8 and 7.4 m3/min on low and high setting respectively.
3. Rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise.
4. Provide a three position rocker switch in the car-operating panel service compartment to control the fan.

2.06 SIGNAL DEVICES AND FIXTURES

A. Car-Operating Panel

1. Digital car position indicator [Blue/White LCD]

2. Flush mounted, brushed stainless steel, tamper resistant, panel with all push buttons, key switches, and message indicators for elevator operation.
3. Buttons - Vandal resistant, illuminated buttons, flush mounted to the panel and marked to correspond to the landings served
4. Door open and door close buttons
5. Connect the emergency call button to a bell that serves as an emergency signal.
6. All buttons to have raised numerals and Braille markings. LED halo illumination with flat Flush targets. Target finishes - satin stainless steel.
7. A lockable phase 2 fire service control cabinet and helmet light.
8. A lockable service cabinet shall be located below emergency features and contain the following controls and services:
   a) INSPECTION rocker switch
   b) CAR LIGHTING rocker switch
   c) 3-position FAN switch
   d) INDEPENDENT SERVICE rocker switch
   e) PUSH TO TEST emergency light switch
   f) 120VAC outlet

B. Other Features
1. ADA compliant communication device designed in response to ADAAG requirements integral with the car operating panel. Phone to be programmed to dial 911; not to call Elevator Company's dispatch center
2. Car Lantern and Chime
   a. Directional lantern visible from the corridor in the car entrance.
   b. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.
3. Landing Passing Signal - A chime bell shall sound in the car to tell a passenger that the car is either stopping at or passing a floor served by the elevator.

C. Hall Fixtures
1. All necessary push buttons and switches for elevator operation, with illuminated halo.
2. Provide raised markings for each push-button.
3. At main egress level provide elevator on emergency power light if applicable
4. At main Egress level provide all necessary Phase 1 Fireman's Service switches and instructions.
5. Provide Emergency Key box complete with all keys required. Coordinate with the Owner to obtain building interior access keys
6. Provide hoistway access keyswitches at bottom and top landings

D. Hall Position Indicator at each floor shall be independent of the Hall Station with Blue/White LCD Display.

2.07 OPERATION AND CONTROL EQUIPMENT

A. Simplex Selective Collective Operation
1. Automatic by means of the car and hall buttons.

2. If all calls in the system have been answered, the car shall park at the last landing served.

B. Car Operating Features

1. Fan/Light Switch
2. Car stall protection
3. Firefighters' Service Phase I and Phase II.
4. Ascending car uncontrolled movement protection
5. Access key switches
6. Top of car inspection station
7. Front/Back door operation
8. Load Weighing Bypass.
9. Independent Service.

C. Control Systems for inspections and Emergency

1. Provide devices within controller to operate the elevator in inspection mode.
2. Provide devices on top of car to operate elevator in inspection mode
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevent motor from running.
4. Provide means from the controller to mechanically lift and control the elevator brake to nearest available landing when power is interrupted
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.

2.08 DOOR OPERATOR EQUIPMENT

A. Door Operator

1. High speed, heavy duty operator to automatically open and close the car and hoistway doors simultaneously,
2. Cushion at both limits of travel
3. Provide electro-mechanical interlock at each hoistway entrance to prevent operation of the elevator unless all doors and closed and locked.
4. Provide an electric contact on each car entrance to prevent operation of elevator unless the car door is closed.

B. Emergency Operation

1. Arrange operator so doors can be easily opened manually from within the car in the event of power failure or interruption in accordance with applicable codes.
2. Furnish emergency devices and keys as required by local authority having jurisdiction.

C. Automatic Operation

1. Doors to open automatically when the car has arrived at or is leveling at the respective landings
2. Doors shall close after a predetermined time interval or immediately upon pressing door close button

3. Provide door open button to reopen the doors and reset the time interval.

D. Hangers & Tracks

1. Provide for each car and hoistway door
2. Contour to match the hanger sheaves
3. Design for power operation

E. Safety Devices

1. Full height infrared door reopening device shall be provided
2. Controls shall be arranged to prevent elevator operation if device is disabled.
3. Doors shall remain open as long as the flow of traffic continues and close shortly after traffic through the opening ceases.

2.09 AUTOMATIC RESCUE DEVICE (ARD)

A. The elevator will not be on emergency generator power.

B. Provide a battery operated ARD to lower the elevator to the closest floor below and open the door for passenger egress in the event of a power failure.

C. Once the passengers have exited the elevator the elevator shall go to the lowest level and shutdown until normal power has been restored and will then resume normal operation..

PART 3 – EXECUTION

3.01 INSPECTION

D. Prior to beginning installation carefully inspect all conditions under which the work is to be installed and verify that no situation exists which would impair the work of this Section. Conditions include but are not limited to

1. Critical dimensions.
2. Hoistway & pit conditions.
3. Control room conditions.
4. Proper electric service.
5. Adequate structural support.
6. Opening locations & sizes.

E. If any condition exists which might impair the work of this Section immediately notify Architect. Do no work until the improper condition has been corrected in an acceptable manner.

3.02 INSTALLATION

A. The Owner and Architect have worked with the elevator manufacturer to provide accommodations for installation of manufacturer's elevator including modifications to the existing elevator shaft and the addition of supplemental steel framing. Contractor shall review existing conditions and modifications identified in the bidding documents and advise the Owner and Architect of any inconsistencies between what is being provided and what is required by the elevator manufacturer. If no such notification is made prior to Bidding, the Contractor acknowledges that the existing elevator shafts, with modifications indicated in the Bidding documents, meet all requirements for installation of the specified elevators and that any costs associated with any required changes identified after Bidding will be the sole responsibility of the contractor.

B. Interface with Work of Others

1. Fire Alarm System Speaker/Strobe – A fire alarm speaker/strobe shall be installed in each elevator car. The Elevator Supplier/Installer shall provide a 2-#14 AWG cable for the strobe and a 2-#18 shielded twisted pair cable for the speaker, both in the hoistway travelling cable for each elevator. The Fire Alarm Supplier shall furnish the speaker/strobes and jumper cables (for wiring from the COP to the speaker/strobe inside the car) and the Elevator Supplier/Installer shall install them. Since this a life safety device, the installation shall be observed by the Fire Alarm Supplier, and tested by same to ensure proper operation. The Fire Alarm Supplier shall provide all necessary wiring from the fire alarm system to the elevator controllers located in the shaft on the 12th floor. The Elevator Supplier/Installer shall make all connections at the controllers and inside the elevator cars.
2. Fire Alarm System Fireman's Hat, Primary Recall and Secondary Recall – The Fire Alarm Supplier shall provide control modules and cabling to each elevator controller located in the shaft on the 12th floor. The Elevator Supplier/Installer shall make final connections inside the controller to provide operation of the fireman's hat, primary recall and secondary recall.
3. Security Camera – A security camera shall be installed in each elevator car. The Elevator Supplier/Installer shall provide a Belden #1694F stranded flexible RG6 coax cable in the hoistway travelling cable for each elevator. The Security System Supplier shall furnish the IP cameras, PoE+ over coax adapter kits, and jumper cables (for wiring from the COP to the camera) and the Elevator Supplier/Installer shall install them. An adaptor will need to be installed at both ends of the coax cable. The Elevator Supplier/Installer shall install one inside the controller connection box in the shaft at the 12th floor and install the other inside the car COP. The Security System Supplier shall provide all necessary wiring from the security system to the elevator controllers located in the shaft on the 12th floor. The Elevator Supplier/Installer shall make all connections at the controllers and inside the elevator cars. The Security System Supplier shall perform all necessary tests for proper operation and coordinate any necessary adjustments with the Elevator Supplier/Installer.
4. Coordinate construction of entrance walls with installation of door frames and sills. Ensure adequate support for entrance attachment points at all landings.
5. Coordinate openings for hall push buttons, signal fixtures, and any required sleeves.
6. Coordinate interface between elevators and fire alarm system.
7. Coordinate interface with telephone system.
8. The Elevator Supplier/Installer shall provide all necessary travelling cables, including spares, and make all final connections at the elevator controller and inside the car.
9. Scheduling of all work shall be coordinated between trades and the Elevator Supplier/Installer to assure that work can be performed in a timely manner without requiring special job visits, otherwise that trade shall compensate the Elevator Supplier/Installer as necessary.
10. The Elevator Supplier/Installer shall provide all provisions at controller and elevator car for all connections and shall include all required materials and labor in their bid to make connections, install equipment described above, and assist with testing.
11. Contractors shall submit equipment data sheets (cut sheets) to the Elevator Supplier/Installer for all equipment that is to be installed inside the elevator car.
12. The Elevator Supplier/Installer shall show all equipment locations and travelling cable information in their submittal drawings for approval.
13. The Electrical Contractor will provide a 1" conduit from each elevator pit to a location near the building's fire alarm control panel, which should be the location for an elevator status panel. The Elevator Supplier/Installer shall provide all necessary wiring, connections and equipment.

C. Properly locate guide rails and related supports and securely attach to building structure

D. Securely fasten hoistway frames to hoistway construction. Coordinate installation of sills and frames with other trades.

E. Sound Isolation - Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and eliminate sources of structure-borne noise from elevator system.

F. Coordinate sill height with flooring installer. Sill height shall include the thickness of the tile and any associated components required for the completed tile installation. Failure to provide the proper code compliant sill height shall be cause for the Elevator Contractor to make whatever adjustments are required at no cost to the Owner.

G. Coordinate the bottom of the COP height to be a minimum of 1/16” above final finished floor to allow COP hinged door to open without rubbing the tile floor. Failure to maintain this clearance shall be cause for the Elevator Contractor to make whatever adjustments are required at no cost to the Owner.

H. Lubricate operating system components according to manufacturer’s recommendations

3.03 FIELD QUALITY CONTROL

A. Field Tests:
   1. Advise Owner, Architect, and governing agencies in advance of dates and times tests are to be performed on elevators.
   2. Acceptance Testing - Upon nominal completion of elevator installation and before permitting use of elevator (either temporary or permanent), perform acceptance tests as required and recommended by Code and governing regulations or agencies.

14. Make a final check of each elevator operation with the Owner’s representative present prior to turning elevator over for use.

15. Demonstrate that control systems and operating devices are functioning properly.

3.04 ADJUSTMENTS & CLEANING

A. At completion of installation, provide suitable protective coverings, barriers, devices, signs or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

B. Provide similar protective measures for elevator units which will be placed in temporary service, including inspection and maintenance service during period of temporary service.

C. Lubricate moving parts of system as recommended by manufacturer.

3.05 CLOSEOUT ACTIVITIES

A. Instruction of Owner:

   1. Instruct Owner's personnel in proper use, operation, and daily maintenance of elevators.

   2. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies.

   3. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Provide new or update Owner’s service tool to allow for maintenance to be performed.

END OF SECTION 142125