



**FIRST FLOOR REMODEL FOR**

# **JUVENILE PROBATION**

**PARK PLAZA DEVELOPMENT  
920 E. PARK BOULEVARD  
PLANO, TEXAS 75074**

**CONSTRUCTION DOCUMENTS  
PROJECT MANUAL**

**PROJECT NUMBER: 2301  
COLLIN COUNTY IFB NO: 2024-480  
ISSUE DATE: DECEMBER 2024  
SET NUMBER: \_\_\_\_\_**





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12-05-24

The following sections were prepared by the Engineer:

**ROOT ENGINEERING SERVICES**

45 FM 3356  
Van Alstyne, Texas 75495

**DIVISION 21 – FIRE SUPPRESSION**

211100 Fire Suppression Sprinklers

**DIVISION 22 – PLUMBING**

220000 Penetration Firestopping for Plumbing  
220500 Common Work Results for Plumbing  
220553 Identification for Plumbing and Piping Equipment  
221100 Domestic Water Piping  
221119 Plumbing Specialties  
221300 Facility Sanitary Sewage  
224400 Plumbing Fixtures  
224700 Drinking Fountains and Water Coolers

**DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING**

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230500 Common Work Results for HVAC  
230529 HVAC Hangers and Supports  
230593 Testing, Adjusting and Balancing for HVAC  
230700 HVAC Insulation  
230800 Commissioning of HVAC  
233300 Air Duct Accessories  
233600 Air Terminals  
238900 Metal Ducts  
239300 Diffusers, Registers, and Grilles

**DIVISION 26 – ELECTRICAL**

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260500 Common Work Results for Electrical  
260519 Low-Voltage Electrical Power Conductors and Cables  
260526 Grounding and Bonding for Electrical Systems  
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**DIVISION 27 – COMMUNICATIONS**

271343 Communications Services Cabling

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

283100 Fire Detection and Alarm

**00 01 08  
PROJECT DIRECTORY**

Owner: **COLLIN COUNTY, TEXAS**  
Attn: Rickee Harris, Building & Projects Coordinator  
Collin County Construction & Projects  
4600 Community Avenue  
McKinney, Texas 75071

Architect: **SPURGIN & ASSOCIATES ARCHITECTS**  
Attn: Kent Spurgin, Principal  
103 W. Louisiana Street  
McKinney, Texas 75069-4413

Mechanical/Electrical  
Engineer: **ROOT ENGINEERING SERVICES**  
Attn: Adam Harris, P.E.  
45 FM 3356  
Van Alstyne, Texas 75495

END OF PROJECT DIRECTORY



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# 001116 Advertisement for Bids

## 1 SCOPE OF WORK

SCOPE OF WORK INCLUDES all materials, labor, equipment and services to produce or be incorporated in such construction. The Project is located in the Park Plaza Development at 920 E. Park Boulevard, Plano, Texas, east of US Highway 75 and west of Avenue K (State Highway 5). The building is located behind the 900 E. Park Boulevard building with no frontage on Park Boulevard. The Contract will be a general contract for the demolition of existing office, finishout, and new general construction, including HVAC, electrical, plumbing and fire sprinkler systems.

Payment for the contract work shall be made pursuant to the terms of the Contract Documents.

## 2 PROBABLE CONSTRUCTION COST

The opinion of probable construction cost for this contract is \$4,000,000

## 3 BID INFORMATION

Collin County uses OpenGov Procurement for the notification and dissemination of all solicitations for commodities and services. The receipt of solicitations through any other company may result in your receipt of incomplete specifications and/or addenda which could ultimately render your bid non-compliant. Collin County accepts no responsibility for the receipt and/or notification of solicitations through any other company.

COLLIN COUNTY APPRECIATES your time and effort in preparing a bid. Collin County prefers to receive all bids electronically through <https://procurement.opengov.com/portal/collincountytx>, however the County will accept hard copy bids. Hard copy paper bid must be in a separate sealed envelope, manually signed in ink by a person having the authority to bind the firm in a contract and marked clearly on the outside as outlined above. Please note that all bids must be received at the designated location by the deadline shown. Bids received after deadline shall be considered void and unacceptable. Collin County is not responsible for lateness of mail, carrier, etc. and time/date stamp clock in the Collin County Purchasing Department shall be the official time of receipt. All bid forms provided in this Invitation for Bid must be completed prior to submission. Failure to complete the forms shall render your bid null and void. We would appreciate you indicating on your "NO BID" response any requirements of this bid request which may have influenced your decision to "NO BID".

BIDS WILL BE publicly opened in the Office of the Purchasing Agent, 2300 Bloomdale Rd, Suite 3160, McKinney, TX 75071, at the date and time indicated above.

No oral, telegraphic, telephonic or facsimile bids will be considered. **Bids submitted via email, CD-ROM, or Flash Drive will not be accepted.** Bids may be submitted in electronic format via Collin County eBid located at <https://procurement.opengov.com/portal/collincountytx>

## 4 PRE-BID INFORMATION

A MANDATORY PRE-BID MEETING & SITE-WALK will be held by Collin County at 920 E. Park Boulevard, Plano, Texas 75074, on **Wednesday, January 29, 2025 at 10:00 am and Thursday, January 30, 2025 at 1:30pm** in order for bidders to ask questions regarding the proposed work. **All Bidders desiring to bid the work must attend ONE of the two meetings, but do not have to attend both (same sites will be viewed at both meetings).** It is the bidder's responsibility to review the site and documents to gain a full understanding of the requirements of the bid.

## 5 BID SECURITY

BID SECURITY: All Bidders must submit, prior to the bid opening time, a Certified Check, Cashier's Check or acceptable Bid Bond payable without recourse to Collin County in the amount of not less than five percent (5%) of the total bid plus alternates as submitted.

- A. Bid Bond, certified check or Cashier's Check may be mailed or hand delivered to the Office of the Collin County Purchasing Agent, Collin County Administration Building, 2300 Bloomdale Road, Ste 3160, McKinney, TX 75071 and shall be delivered in an envelope, marked plainly on the outside with the Bid Name and Number.
- B. Bidders submitting a bid via Collin County eBid shall upload a Bid Bond at <https://procurement.opengov.com/portal/collincountytx>

Regardless of delivery method, all Bid Bonds shall be received prior to the bid opening time to be considered. **Failure to submit a copy of bid security prior to bid opening shall be cause for rejection of bid.**

The original Bid Bond shall be received in the Collin County Purchasing Department **no later than** close of business on the third working day after the bid opening. **Late receipt of or failure to submit original Bid Bond shall be cause for rejection of bid.**

## 6 BONDS

Contractor must furnish a performance bond, payment bond and one (1) year maintenance bond within ten (10) consecutive calendar days following award of contract. The bonds shall be issued by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects.

# 002113 Instructions to Bidders

## 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

## 1.02 DEFINITIONS

- A. All definitions set forth in the General Conditions of the Contract for Construction or in other Contract Documents are applicable to these Bidding Documents.
- B. Bidding Documents include the Advertisement or Invitation for Bids, Instructions to Bidders, the bid form, other sample bidding and contract forms and the proposed Contract Documents including any Addenda issued prior to receipt of bids.
- C. Addenda are written or graphic instruments issued prior to the opening of the Bidding Documents, which modify or interpret the Bidding Documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.
- D. Spurgin & Associates Architects will be hereafter referred to in the Project Manual as “Architect” and all correspondence shall be addressed to: Kent Spurgin, Spurgin & Associates Architects, 03 W Louisiana St, McKinney, TX 75069.
- E. “Rickeye Harris” will be hereinafter referred to in this Project Manual as “Project Manager”.
- F. “Collin County” will be hereafter referred to in this Project Manual as “Owner”.
- G. A Bid is a complete and properly signed submittal to do the Work for designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- H. The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which work may be added or from which work may be deleted for sums stated in Alternate Bids.
- I. An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid in the corresponding change in the Work, as described in the Bidding Documents or in the proposed Contract Documents.
- J. A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or service as described in the Bidding Documents or in the proposed Contract Documents.
- K. A Bidder is a person or entity who submits a Bid.

- L. A Sub-Bidder is a person or entity who submits a bid to a Bidder for materials or labor for a portion of the work.
- M. A Contractor is a person or entity who is determined to be the lowest responsible and responsive bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.
- N. The Bid Requirements and Other General Conditions, as provided under the Division of the North Central Texas Council of Governments Standard Specifications for Public Works Construction will be applicable to this project, unless noted otherwise in the Contract Documents

### 1.03 EXAMINATION OF DOCUMENTS AND SITE

- A. Each bidder, by making his/her Bid, represents that he/she has read and understands the Bidding Documents.
- B. Each Bidder, by making his/her Bid, represents that he/she has visited the site, performed investigations and verifications as he/she deems necessary, and familiarized himself/herself with the local conditions under which the Work is to be performed and will be responsible for any and all errors in his/her bid resulting from his/her failure to do so.
- C. The location and elevations of the various utilities and pipe work included within the scope of the work are offered as a general guide only, without guarantee as to accuracy. The Contractor shall verify and investigate to his/her own satisfaction the location and elevation of all utilities, pipe work, and the like and shall adequately inform himself/herself of their relation to the work before submitting a bid.
- D. Before submitting a bid each bidder will, at bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information (surface, subsurface, and underground facilities) at or contiguous to the site, or otherwise which may affect cost, progress, performance or furnishing of the work and which bidder deems necessary to determine its bid for performing and furnishing the work in accordance with the time, price and other terms and conditions of the Contract Documents. Bidder will rely solely on its own site investigation and assumes the risk of any site conditions not discovered that may result in additional costs and all errors in the bid.
- E. On request in advance, Owner will provide each bidder access to the site to conduct explorations and tests as each bidder deems necessary for submission of a bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.
- F. The lands upon which the work is to be performed, right-of way and easement for access thereto and other lands designated for use by Contractor in performing the work are identified in the Contract.
- G. Each bidder by making his/her bid represents that his/her bid is based upon the materials, systems, and equipment required by the Bidding Documents without exception.



## 1.04 BIDDING DOCUMENTS

- A. Complete sets of Bidding Documents shall be used in preparing bids; neither County, nor Architect assume any responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.
- B. County or the Architect, in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

## 1.05 BIDDING PROCEDURES

- A. All bids shall be prepared on the forms provided by the Architect and submitted in accordance with the Instruction to Bidders. The Architect or owner will furnish bidders with bid forms which will provide for the following bid items. Bidders shall provide all requested information. Prices bid/proposed shall only be considered if they are provided in the appropriate space(s) on the Collin County bid form(s). For consideration, any additions or deductions to the bid/proposal prices offered must be shown under the exceptions section of the bid/proposal in the case of electronic submittal, ONLY in the case of a hard copy submittal will an additional attachment be allowed. Extraneous numbers, prices, comments, etc. or bidder/offeror generated documents appearing elsewhere on the bid or as an additional attachment shall be deemed to have no effect on the prices offered in the designated locations.
  - 1. A single contract price for each bid item as detailed and described in these specifications.
  - 2. Acknowledgment of Addenda.
  - 3. Number of consecutive calendar days to complete project.
  - 4. Alternate bids.
  - 5. Unit prices.
- B. A bid (electronic or hard copy) is invalid if it has not been deposited at the designed location prior to the time and date for receipt of bids indicated in the Advertisement or Invitation For Bid, or prior to any extension thereof issued to the bidders. Bids received in County Purchasing Department after submission deadline shall be returned unopened and will be considered void and unacceptable. Owner is not responsible for lateness of mail, carrier, etc. and time/date stamp clock in County Purchasing Department shall be the official time of receipt.
- C. Unless otherwise provided in any supplement to these Instructions to Bidders, no bidder shall modify, withdraw or cancel his/her bid or any part thereof for ninety (90) consecutive calendar days after the time designated for the receipt of bids in the Advertisement or Invitation For Bid.
- D. Bids shall not contain any recapitulation of the Work to be done.

- E. The Bidder shall make no additional stipulations on the Bid Form nor limit or qualify his/her bid in any other manner. Bids so qualified will be subject to disqualification.
- F. Collin County is by statute exempt from the State Sales Tax and Federal Excise Tax; therefore, the prices submitted shall not include taxes.

## 1.06 DISCREPANCIES AND AMBIGUITIES

Any interpretations, corrections and/or changes to an Invitation for Bid and related Specifications or extensions to the opening/receipt date will be made by addenda to the respective document by the Collin County Purchasing Department. Questions and/or clarification requests must be submitted no later than the date specified in the solicitation. Those received at a later date may not be addressed prior to the public opening. Sole authority to authorize addenda shall be vested in Collin County Purchasing Agent as entrusted by the Collin County Commissioners Court. Addenda may be transmitted electronically via Collin County eBid, by facsimile, E-mail transmission or mailed via the US Postal Service.

- A. Addenda will be transmitted to all that are known to have received a copy of the IFB and related Specifications. However, it shall be the sole responsibility of the Bidder to verify issuance/non-issuance of addenda and to check all avenues of document availability (i.e. OpenGov Procurement at <https://procurement.opengov.com/portal/collincountytx>, telephoning Purchasing Department directly, etc.) prior to opening/receipt date and time to insure Bidder's receipt of any addenda issued. Bidder shall acknowledge receipt of all addenda.

## 1.07 SUBSTITUTIONS

- A. Each bidder represents that his/her bid is based upon the materials and equipment described in the Bidding Documents.
- B. No substitution will be considered unless written request has been submitted to the Architect for approval by the date specified in the solicitation. Submit substitution request forms to [gsnodderly@co.collin.tx.us](mailto:gsnodderly@co.collin.tx.us).
- C. If the Architect and Owner approves a proposed substitution, such approval will be set forth in an Addendum.

## 1.08 QUALIFICATION OF BIDDERS

- A. Within seven (7) consecutive calendar days following bid opening, the apparent low bidder shall submit with a properly executed Contractor's Qualification Statement as evidence to establish bidder's financial responsibility, experience and possession of such equipment as may be needed to prosecute the work in an expeditious, safe and satisfactory manner. This Statement shall include:
  - 1. List of current projects.

2. List of projects completed within the past five years.
  3. Experience of key individuals of the organization.
  4. Trade and Bank references.
  5. A recent financial statement to confirm that the bidder has suitable financial status to meet obligations incidental to performing the work. Audited financial statements are not mandatory. Unaudited financial statements will be accepted. If bidder's firm does, however, have audited statements, please include a copy with your bid.
  6. A statement of cost for each major item of Work included in the Bid.
  7. A designation of the Work to be performed by the Bidder with his/her own forces.
  8. A list of names of the Subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for each portion of the Work. The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the proposed Subcontractors. Prior to the award of the Contract, the Architect will notify the Bidder in writing if either the County or the Architect, after due investigation, has reasonable and substantial objection to any person or organization on such lists. If Owner or Architect has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization, the Bidder may, at his/her option, withdraw his/her Bid without forfeiture of Bid Security or provide an acceptable substitute. Subcontractors and other persons and organizations proposed by the Bidder and accepted by Owner and Architect must be used on the Work for which they were proposed and accepted, and shall not be changed except with the written approval of Owner and the Architect.
- B. Bidders may be disqualified and their bids not considered for any of the following specific reasons:
1. Reason for believing collusion exists among bidders.
  2. The bidder being interested in any litigation against Owner.
  3. The bidder being in arrears on any existing contract or having defaulted on a previous contract.
  4. Lack of competency as revealed by the financial statement, experience and equipment, questionnaires, or qualification statement.
  5. Uncompleted work which in the judgment of Owner will prevent or hinder the prompt completion of additional work if awarded.

- C. Minimum Standards For Responsible Prospective Bidders: A prospective Bidder must meet the following minimum requirements. Collin County may request representation and other information sufficient to determine Bidder's ability to meet these minimum standards listed below.
1. have adequate financial resources, or the ability to obtain such resources as required;
  2. be able to comply with the required or proposed delivery/ completion schedule;
  3. have a satisfactory record of performance;
  4. have a satisfactory record of integrity and ethics; and
  5. be otherwise qualified and eligible to receive an award.
- D. In determining to whom to award the contract, the Owner may consider;
1. the purchase price;
  2. the reputation of the bidder/contractor/vendor and of the bidder/contractor/vendor's goods or services;
  3. the quality of the bidder/contractor/vendor's goods or services;
  4. the extent to which the goods or services meet the Owner's needs;
  5. the bidder/contractor/vendor's past relationship with the Owner;
  6. the total long-term cost to the Owner to acquire the bidder/contractor/vendor's goods or services; and
  7. any other relevant factors specifically listed in the Instruction to Bidders.

## 1.09 PREPARATION OF BID

- A. Bidder shall submit his/her bid on the forms furnished by the Architect. All blank spaces in forms shall be correctly filled in and the bidder shall state the prices, written in words and in figures. Where there is discrepancy between the price written in words and the price written in figures, the price written in words shall govern. If bid is submitted by an individual, his/her name must be signed by him/her or his/her duly authorized agency. If the bid is submitted by a firm, association or partnership, the name and address of each member must be given, and the bid must be signed by an official or duly authorized agent. Powers of attorney authorizing agents or others to sign bids must be properly certified and must be in writing and submitted with the bid.
- B. Bidder shall bear any/all costs associated with its preparation of any bid, proposal or submittal.

- C. Public Information Act: Collin County is governed by the Texas Public Information Act, Chapter 552 of the Texas Government Code. All information submitted by prospective bidders during the bidding process is subject to release under the Act.
- D. The Bidder shall comply with Commissioners Court Order No. 2004-167-03-11, County Logo Policy.

## 1.10 BID SECURITY

- A. Each bid must be accompanied by Bid Security (in accordance with instructions set forth in section 001116-Advertisement For Bids) made payable to Owner in an amount of five percent (5%) of the bidder's maximum bid price and in the form of a Cashier's Check or a Bid Bond, duly executed by bidder as principal and having as surety thereon, a corporate surety authorized and admitted to do business in the State of Texas and licensed to issue such bond, as a guarantee that the bidder will enter into a Contract and execute required Performance, Payment, and two (2) year Maintenance Bonds within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract.
- B. The Bid Security of the contractor will be retained until such bidder has executed the Contract Agreement and furnished the required Contract Security, whereupon, the Bid Security will be returned. If the contractor fails to execute and deliver the Agreement and furnish the required Contract Security within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, Owner may annul the award of contract and the Bid Security of that bidder will be forfeited. The Bid Security of the other bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh (7th) consecutive calendar day after the effective date of the Agreement or the ninety-fifth (95th) consecutive calendar day after the bid opening, whereupon, the Bid Security furnished by such bidders will be returned. Bid Security with bids which are not competitive will be returned within seven (7) consecutive calendar days after the contract award.
- C. Should the bidder to whom the Contract is awarded refuse or neglect to execute and file the contract and bonds within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, Owner may annul award of Contract and the Bid Security filed with the bid shall become the property of Owner, not as a penalty, but as liquidated damages. Owner reserves the right to award canceled Contract to next responsible, lowest and best bidder as it deems to be in the best interest of the County.
- D. Owner will have the right to retain the bid security of all bidders until either:
  - 1. the Contract has been executed and the bonds have been furnished, or
  - 2. the specified time has elapsed so that bids may be withdrawn, or
  - 3. all bids have been rejected.

## 1.11 PERFORMANCE BOND, LABOR & MATERIAL PAYMENT BOND, MAINTENANCE BOND

- A. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a Performance Bond in the amount of one hundred percent (100%) of the total contract price in such form as is satisfactory to Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.
- B. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a Payment Bond in the amount of one hundred percent (100%) of the total contract price in such form as is satisfactory to Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.
- C. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a two (2) year Maintenance Bond in the amount of ten percent (10%) of the total contract price in such form as is satisfactory to Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.
- D. The Contractor must demonstrate to Owner that it can secure the required performance and payment bonds, issued by a corporate surety company authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. Contractor must also demonstrate that the bond is not in excess of ten percent (10%) of the corporate surety company's capital and surplus. To the extent the amount of the bond exceeds ten percent (10%) of the corporate surety company's capital and surplus, such bond will not be accepted unless bidder provides written certification that the corporate surety company has reinsured the portion of the risk that exceeds ten percent (10%) of the corporate surety company's capital and surplus with one or more insurers who are duly authorized, accredited or trusted to do business in the State of Texas. The amount reinsured by any reinsurer must not exceed ten percent (10%) of the reinsurer's capital and surplus.
- E. The Contractor must file with the performance bond and payment bond, all documents and information necessary to establish that the agent signing the bond is authorized to write the bond in

the amount requested, and if applicable, that reinsurance requirements, have been met, including limits and ratings or other evidence of company solvency.

- F. If the corporate surety company on any bond furnished by Contractor to Owner is declared bankrupt or becomes insolvent or such corporate surety company's right to do business in the State of Texas is revoked, the Contractor shall within five (5) consecutive calendar days thereafter substitute another bond and corporate surety company, both of which shall be acceptable to Owner.

## 1.12 FILING BID

- A. All Bids, proposals, or submittals submitted in hard copy paper form shall be submitted in a sealed envelope, plainly marked on the outside with the Invitation for Bid (IFB) number and name. A hard copy paper form bid, proposal, or submittal shall be manually signed in ink by a person having the authority to bind the firm in a contract. Submittals, bids or proposals shall be mailed or hand delivered to the Collin County Purchasing Department.
- B. No oral, telegraphic or telephonic submittals will be accepted. Bids, proposals, or submittals may be submitted in electronic format via Collin County eBid at <https://procurement.opengov.com/portal/collincountytx>.
- C. All Bids, submittals or proposals submitted electronically via OpenGov Procurement at <https://procurement.opengov.com/portal/collincountytx> shall remain locked until official date and time of opening as stated in the Special Terms and Conditions of the IFB.
- D. For hard copy paper form bids, proposals, or submittals, any alterations made prior to opening date and time must be initialed by the signer of the bid, proposal, or submittal, guaranteeing authenticity. Bids, proposals, or submittals cannot be altered or amended after submission deadline.
- E. No bid, proposal, or submittal will be considered unless it is filed with the Owner Purchasing Department within the time limit for receiving bids as stated in the Advertisement for Bids or IFB. Each hard copy paper bid shall be in a sealed envelope plainly marked with the word "BID", and the name and bid number of the project as designated in the Advertisement for Bids or IFB.

## 1.13 MODIFICATION AND WITHDRAWAL OF BID

- A. No bid, proposal, or submittal may be withdrawn or modified after the bid opening except where the award of the contract has been delayed beyond ninety (90) consecutive calendar days after date of bid opening or as per Texas Local Government Code, Title 8, Chapter 262, Subchapter C., Section 262.0305. Modifications after Award.

## 1.14 IRREGULAR BID

- A. It is understood that Collin County, Texas reserves the right to accept or reject any and/or all Bids, proposals, or submittals for any or all products and/or services covered in an Invitation For Bid (IFB) and to waive informalities or defects in submittals or to accept such submittals as it shall deem to be in the best interest of Collin County.

## 1.15 REJECTION OF BID

- A. The bidder acknowledges the right of Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of Owner to reject a bid if the bidder failed to furnish any required Bid Security, or to submit the data required by the Bidding Documents, or if the bid is in any way incomplete or irregular.

## 1.16 METHOD OF AWARD

- A. In evaluating bids, Owner will consider whether or not the bids comply with the prescribed requirements, base prices, any alternates, unit pricing, completion time, bidder's qualifications, bidder's proposed subcontractors, suppliers, etc., and other data as may be requested in the Bid Documents.
- B. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications and financial ability of bidder, proposed subcontractors, suppliers and other persons and organizations to perform and furnish the Work in accordance with the Bidding Documents to Owner's satisfaction within the prescribed time.
- C. If the contract is to be awarded, it will be awarded to the lowest and best responsible bidder whose evaluation, by Owner, indicates to be in the best interests of the project. If no alternates are selected by Owner, the Owner may award the contract to a responsible bidder who submits the lowest and best bid.
- D. Evaluation of Alternates - Any and/or all or none of the alternates may be considered in evaluation. Owner may award Contract on base bid plus any and/or all or none of the alternates.
- E. Owner anticipates award within ninety (90) consecutive calendar days after bid opening.
- F. The bid, when properly accepted by the County, shall constitute a Contract equally binding between the contractor and Owner. No different or additional terms will become part of this Contract with the exception of a written Change Order, signed by both parties.
- G. No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting contract. All change orders to the contract will be made in writing by Collin County Purchasing Agent.

## 1.17 EXECUTION OF CONTRACT



- A. The person or persons, partnership, company, firm, association or corporation to whom a contract is awarded shall within ten (10) consecutive calendar days after such award, sign the necessary contract agreements and submit the required bonds entering into the required Contract with Owner. No contract shall be binding on Owner until it has been executed by Owner or his/her duly authorized representative, and delivered to the Contractor.

## 1.18 FAILURE TO EXECUTE CONTRACT

- A. The failure of the Bidder to execute the required bonds or to sign the required Contract within ten (10) consecutive calendar days after the Contract is awarded, shall be considered by Owner as abandonment of his/her Bid, and Owner may annul the award, at the Owner's sole discretion.

## 1.19 PURCHASE ORDER

- A. A purchase order(s) shall be generated by Owner to the contractor. The purchase order number **must** appear on all itemized invoices. Collin County will not be responsible for any orders placed or delivered without a valid purchase order number.

## 1.20 NOTICE TO PROCEED

- A. Upon the execution and delivery of Bonds, Executed Contract by Contractor, progress schedule, proof of insurance, and all other documents required prior to commencing work herein, Owner will issue a written Notice to Proceed to the Contractor requesting that he/she proceed with construction, and the Contractor shall commence work within ten (10) consecutive calendar days after the date of Notice to Proceed.

## 1.21 PAYMENT PROCEDURES

- A. Contractor shall submit Applications for Payment in accordance with the Contract, and payments shall be made in accordance with the Contract Documents.
- B. Final Payment: Upon final completion and acceptance of the work, Owner shall pay the remainder of the contract price as recommended by Architect, in accordance with Texas Government Code, Title 10, Subtitle F., Chapter 2251. Contractor(s) is required to pay subcontractors within ten (10) days after the contractor has received payment from the County.
- C. The Contractor understands, acknowledges and agrees that if the Contractor subcontracts with a third party for services and/or material, the primary Contractor (awardee) accepts responsibility for full and prompt payment to the third party. Any dispute between the primary Contractor and the third party, including any payment dispute, will be promptly remedied by the Contractor. Failure to promptly render a remedy or to make prompt payment to the third party (subcontractor) may result in the

withholding of funds from the primary Contractor by Collin County for any payments owed to the third party.

## 1.22 AFFIDAVIT OF BILLS PAID

- A. Prior to final acceptance of this project by Owner, the Contractor shall execute an affidavit that all bills for labor, materials, and incidentals incurred in the project construction have been paid in full, and that there are no claims pending.

## 1.23 EXEMPTION FROM STATE OF TEXAS AND LOCAL SALES TAX ON MATERIALS

- A. Owner qualifies for exemption from State and Local Sales Tax pursuant to the provisions of Chapter 151, Section 151.309 of the Texas Limited Sales, Excise and Use Tax Act. The Contractor performing this Contract may purchase all materials, supplies, equipment consumed in the performance of this Contract by issuing to his/her suppliers an exemption certificate in lieu of the tax.

## 1.24 CONFLICT OF INTEREST

- A. No public official shall have interest, direct or indirect, in this contract, in accordance with Texas Local Government Code Title 5, Subtitle C, Chapter 171.

## 1.25 ETHICS

The bidder/contractor shall comply with Commissioners Court Order No. 96-680-10-28, Establishment of Guidelines & Restrictions Regarding the Acceptance of Gifts by County Officials & County employees.

## 1.26 BID COMPLIANCE

- A. Bid must comply with all federal, state, county and local laws concerning this type of project and the fulfillment of all ADA (Americans With Disabilities Act) requirements.
- B. Design, strength, quality of materials and workmanship must conform to the highest standards of manufacturing and engineering practice.
- C. All products must be new and unused, unless otherwise specified, in first-class condition and of current manufacture.

## 1.27 DRUG FREE

- A. All bidders shall provide any and all notices as may be required under the Drug-Free Work Place Act of 1988, 41 U.S.C. 701, and Collin County Commissioners Court Order No. 90-455-06-11, to its employees and all sub-contractors to insure that Owner maintains a drug-free work place. The use, possession or being under the influence of drugs and/or alcohol while working on this bid project or while on County property is prohibited and may result in removal of an individual from the project and/or immediate

termination of contract. The County reserves the right to review drug testing records of any personnel involved in this bid project. The County may require, at contractor's expense, drug testing of contractor's personnel if no drug testing records exists or if such test results are older than six (6) months.

B. Substances and cut-off levels are as follows:

SUBSTANCE	MAXIMUM LEVEL
Amphetamines	1000 NG/ML
Barbiturates	300 NG/ML
Benzodiazepines	300 NG/ML
Cocaine Metabolite	300 NG/ML
Opiates	300 NG/ML
Phencyclidine (PCP)	25 NG/ML
THC (Marijuana) Metabolite	100 NG/ML
Methadone, Urinary	300 NG/ML
Methaquaone, Urine	300 NG/ML
Propoxyphene	300 NG/ML

## 1.28 INDEMNIFICATION

A. To the fullest extent permitted by law, the CONTRACTOR and his sureties shall indemnify, defend and hold harmless the OWNER and all of its, past, present and future, officers, agents and employees from all suits, cause of action, claims, liabilities, losses, fines, penalties, liens, demands, obligations, actions, proceedings, of any kind, character, name and description brought or arising, on account of any injuries or damages received or sustained by any person, destruction or damage to any property on account of, in whole or part, the operations of the CONTRACTOR, his agents, employees or subcontractors; or on account of any negligent act or fault of the CONTRACTOR, his agents, employees or subcontractors in the execution of said Contract; failing to comply with any law, ordinance, regulation, rule or order of

any governmental or regulatory body including those dealing with health, safety, welfare or the environment; on account of the failure of the CONTRACTOR to provide the necessary barricades, warning lights or signs; and shall be required to pay any judgment, with cost, which may be obtained against the OWNER growing out of such injury or damage. In no event shall OWNER be liable to CONTRACTOR for indirect or consequential damages or loss of income or profit irrespective of the cause, fault or reason for same. CONTRACTOR'S duty to indemnify herein shall not be limited by any limitation on the type or amount of damages payable by or for CONTRACTOR or any Subcontractor under workman's compensation acts, disability benefit acts or any other employee benefit acts.

In addition, the CONTRACTOR likewise covenants and agrees to, and does hereby, indemnify and hold harmless the OWNER from and against any and all injuries, loss or damages to property of the OWNER during the performance of any of the terms and conditions of this Contract, arising out of or in connection with or resulting from, in whole or in part, any and all alleged acts or omissions of officers, agents, servants, employees, contractors, subcontractors, licenses or invitees of the CONTRACTOR.

The rights and responsibilities provided in this indemnification provision shall survive the termination or completion of this Contract.

## 1.29 CONSTRUCTION SCHEDULE

- A. The time for completion is set forth herein and will be included in the Contract. All work shall be completed within the consecutive calendar day count shown in the Contractor's bid. The calendar day count shall commence ten (10) consecutive calendar days after the date of the Notice to Proceed.
- B. Prior to the issuance of the Notice to Proceed by Owner, the Contractor shall submit a detailed progress and schedule chart to Owner for review. This chart will be used to assure completion of the job within the number of consecutive calendar days stated in bid documents.

## 1.30 DELAYS AND EXTENSIONS OF TIME

- A. 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 which 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.
- B. 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 and could not have been reasonably anticipated, and that the weather conditions had an adverse effect on the scheduled construction.

- C. Contractor's sole remedy for any delays in the project, which are not the fault of the Contractor, shall be an equitable extension of time to perform the work, required by the Contract. In no event shall the Contractor be entitled to make a claim for delay, impact or acceleration damages against the Owner.

### 1.31 DAMAGES

Should the contractor fail to complete the project within the specified completion schedule the sum of \$1000 per calendar day will be deducted from the moneys due the contractor for the work. This sum shall not be considered as a penalty, but rather as reasonable liquidated damages, since it would be impracticable or extremely difficult to fix the actual damages. An extension of time may be allowed for delays beyond the control of the contractor at the discretion of Owner.

### 1.32 TERMINATION

This contract shall remain in effect until any of the following occurs:

- A. completion of project;
- B. acceptance of work ordered; or
- C. termination by either party pursuant to the terms of the Contract with a thirty (30) days written notice prior to cancellation that must state therein the reasons for such cancellation.
- D. breach of the contract by the Contractor for failure
  - 1. to meet completion schedules, or
  - 2. otherwise perform in accordance with these specifications.

Breach of contract or default authorizes the County to purchase elsewhere and charge the full increase in cost and handling to the defaulting Contractor.

### 1.33 PATENTS - COPYRIGHTS

- A. The contractor agrees to protect Owner from any claims involving infringements of patents and/or copyrights. In no event shall Owner be liable to a contractor for any/all suits arising on the grounds of patent(s) or copyright(s) infringement.

### 1.34 VENUE; GOVERNING LAW

- A. This contract will be governed by the laws of the State of Texas. Should any portion of this contract be in conflict with the laws of the State of Texas, the State laws shall invalidate only that portion. The remaining portion of the contract shall remain in effect. This contract is performable in Collin County, Texas.

### 1.35 ASSIGNMENT

- A. The contractor shall not sell, assign, transfer or convey this contract, in whole or in part, without the prior written approval from Collin County Commissioners Court.

### 1.36 SILENCE OF SPECIFICATION

- A. The apparent silence of any part of the specification as to any detail or to the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail. All interpretations of the specification shall be made on the basis of this statement.

### 1.37 PROVISION CONCERNING ESCALATOR CLAUSES

- A. Bid(s) containing any condition which provides for changes in the stated bid prices due to increase or decrease in the costs of materials, labor, or other items required for this project, will be rejected and returned to the bidder without being considered.

### 1.38 ESTIMATES OF QUANTITIES

- A. The quantities listed in the Bid Form will be considered as approximate and will be used for the comparison of bids. Payments will be made to the Contractor only for the actual quantities of work performed or materials furnished in accordance with the contract. The quantity of work to be done and the materials may be increased or decreased as provided for in the Contract Documents.

### 1.39 TREE PROTECTION OUTSIDE LIMITS OF WORK

- A. The Contractor will be required to obtain written authorization from Owner for the removal of any tree three inches (3") in diameter or greater for any area outside the limits of the street right-of-way or slope easement. It is the intent of Owner to preserve as much as possible the natural condition of the floodplains.

### 1.40 EXCAVATION/TRENCH SAFETY

- A. TRENCH SAFETY
  1. The CONTRACTOR shall be responsible for complying with state laws and federal regulations relating to trench safety, including those which may be enacted during the performance under this contract. The CONTRACTOR shall be responsible for selecting an appropriate method of providing trench safety after due consideration of the job conditions, location of utilities, pavement conditions and other relevant factors. Slope-back methods which may result in unnecessary displacement of utilities and/or destruction of pavement may not be used without permission from the OWNER. The CONTRACTOR shall be responsible for providing to the OWNER an acceptable

trench safety plan signed and sealed by a Professional Engineer qualified to do such work and registered in Texas. Devices used to provide trench safety such as trench shields and shoring systems will be likewise certified by professional Engineers registered in the State of Texas or by a professional Engineer registered in the state of manufacture of the shield.

**B. PAYMENT FOR TRENCH SAFETY**

1. Payment for trench safety shall be by the lineal feet of trench exceeding a depth of five (5) ft. Excavation for slope-back methods shall be subsidiary to the trench safety pay item including replacement and recompaction. Excess excavation for other trench safety methods is also subsidiary to the trench safety pay item. Costs relating to the preparation of the trench safety plan including geotechnical investigation, testing and report preparation fees are all subsidiary to the pay item for trench safety. Should trench safety measures be required during contract performance where no pay item has been provided, then the CONTRACTOR shall immediately notify the OWNER and, if directed to do so, provide trench safety under the provisions of the contract. Should the OWNER fail to authorize the work, then the CONTRACTOR shall proceed under the provisions of the Contract. Trench safety requirements are mandatory and may not be waived.

**C. PAYMENT FOR SPECIAL SHORING**

1. Payment for special shoring, if any, shall be based on the square feet of shoring used.

- D. The Contractor must be made aware that on construction projects in which trench excavation will exceed a depth of five feet (5'), the uniform set of general conditions must require that the bid documents and the contract include detailed plans and specifications for adequate safety systems that meet Occupational Safety and Health Administration standards that will be in effect during the period of construction of the project. The Contractor shall provide a separate pay item for trench excavation safety in accordance with the Texas Health & Safety Code Chapter 756. The Contractor shall verify that these plans and specifications include a pay item for these same trench excavation safety systems, in accordance with Texas Government Code, Title 10, Section 2166.303, Uniform Trench Safety Conditions. The contractor shall insure that drainage from adjacent properties is not blocked by his/her excavations. Measurement and payment for excavation/trench safety systems will not be made directly, but considered subsidiary to the work.

- E. The Contractor shall be responsible for obtaining and paying for all surveys and testing, including geotechnical surveys and testing, necessary to insure it can comply with all laws regarding adequate trench excavation safety.

## **1.41 CONSTRUCTION STAKING**

- A. Architect will provide the Contractor with primary horizontal and vertical control to consist of one construction baseline and two benchmarks.

- B. The Contractor shall take all necessary precautions to preserve any and/or all markings and staking. Payment for costs of restaking shall be the responsibility of the Contractor.

#### 1.42 PERMITS

- A. Contractor shall be responsible for obtaining all necessary permits.

#### 1.43 MATERIALS TESTING

- A. Owner will be responsible for all materials testing.

#### 1.44 STORM WATER PROTECTION

- A. The Contractor shall perform, track, participate, implement, and comply with storm water pollution prevention minimum control measures, protocols, and best management practices (BMP) and ensure that water quality standards are not violated in accordance with all regulations and policies as they apply to the Texas Pollutant Discharge Elimination System general permits. Applicable permits include:
  - 1) Texas Construction General Permit (TXR150000).
- B. Contractors will obtain permit coverage for construction activities disturbing over one acre of land (total acreage is cumulative across all portions of the project). BMPs include, but are not limited to:
  - 1. Preparing and implementing a site-specific Storm Water Pollution Prevention Plan (SWPPP) as outlined in the permit and prior to any soil disturbance.
  - 2. Installing and managing erosion and sediment control.
  - 3. Make available, upon request, permit associated documentation.
  - 4. Practicing spill prevention and good housekeeping.
  - 5. Meeting the requirements of the MS4 permit.

#### 1.45 WAGE SCALE

- A. In accordance with Texas Government Code, Title 10, Section 2258, Prevailing Wage Rates, the general prevailing wage rate has been determined for this locality for the craft or type of workman needed to execute work of a similar character of the project listed herein. The Contractor shall pay the prevailing wage rate in this locality to all his/her employees and subcontractors performing work on this project, and in no event shall the Contractor pay less than the rate shown in the following schedule.
- B. Wage Determination: Building Construction, <https://sam.gov/wage-determination/TX20240239/1>
- C. Except for work on legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) the number of hours worked per day, except for overtime hours, times (b) the above respective rate per hour.



- D. For legal holidays, the “General Prevailing Rate of Per Diem Wage” for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on the legal holiday.
- E. For overtime work, the “General Prevailing Rate of Per Diem Wage” for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) Under the provisions of Texas Government Code, Title 10, Section 2258, Prevailing Wage Rates, the contractor or subcontractor of the contractor shall forfeit as a penalty to the entity on whose behalf the contract is made or awarded, sixty dollars (\$60.00) for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the contract.
- F. If the construction project involves the expenditure of Federal funds in excess of \$2,000, the minimum wages to be paid various classes of laborers and mechanics will be based upon the wages that will be determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on the project of a character similar to the contract work.

#### 1.46 CONTRACT ADMINISTRATOR

- A. Collin County Purchasing Department shall serve as Contract Administrator or shall supervise agents designated by Collin County.

#### 1.47 WARRANTIES

- A. All warranties shall be stated as required in the Uniform Commercial Code.

#### 1.48 UNIFORM COMMERCIAL CODE

- A. The Contractor and Collin County agree that both parties have all rights, duties, and remedies available as stated in the Uniform Commercial Code.

#### 1.49 ADVERTISEMENT OF CONTRACT

- A. Contractor shall not fraudulently advertise, publish or otherwise make reference to the existence of a contract between Collin County and Contractor for purposes of solicitation. As exception, Contractor may refer to Collin County as an evaluating reference for purposes of establishing a contract with other entities.

#### 1.50 DIAGNOSTIC TOOLS

- A. Contractor shall provide Collin County with diagnostic access tools at no additional cost to Collin County, for all Electrical and Mechanical systems, components, etc., procured through this contract.

#### 1.51 CRIMINAL HISTORY BACKGROUND CHECK

- A. If required, ALL individuals may be subject to a criminal history background check performed by Collin County prior to access being granted to Collin County facilities. Upon request, Vendor/Contractor/Provider shall provide list of individuals to Collin County Purchasing Department within five (5) working days.

## 1.52 IMMIGRATION AND REFORM ACT OF 1986

- A. Vendors/Contractors/Providers must be in compliance with the Immigration and Reform Act of 1986 and all employees specific to this solicitation must be legally eligible to work in the United States of America.

## 1.53 CERTIFICATION OF ELIGIBILITY

- A. This provision applies if the anticipated Contract exceeds \$100,000.00 and as it relates to the expenditure of federal grant funds. By submitting a bid or proposal in response to this solicitation, the Bidder/Quoter/Offeror certifies that at the time of submission, he/she is not on the Federal Government's list of suspended, ineligible, or debarred contractors. In the event of placement on the list between the time of bid/proposal submission and time of award, the Bidder/Quoter/Offeror will notify the Collin County Purchasing Agent. Failure to do so may result in terminating this contract for default.

## 1.54 NOTICE TO CONTRACTORS (IF APPLICABLE)

- A. The Collin County Detention Facility houses persons who have been charged with and/or convicted of serious criminal offenses. When entering the Detention Facility, you could:
  1. hear obscene or graphic language;
  2. view partially clothed male inmates;
  3. be subjected to verbal abuse or taunting;
  4. risk physical altercations or physical contact, which could be minimal or possibly serious;
  5. be exposed to communicable or infectious diseases;
  6. be temporarily detained or prevented from immediately leaving the Detention Facility in the case of an emergency or "lockdown; and
  7. subjected to a search of your person or property.

While the Collin County Sheriff's Office takes every reasonable precaution to protect the safety of visitors to the Detention Facility, because of the inherently dangerous nature of a Detention Facility and the type of the persons incarcerated therein, please be advised that the possibility of such situations exist and you should carefully consider such risks when entering the Detention Facility. By entering the Collin County Detention

Facility, you acknowledge that you are aware of such potential risks and willingly and knowingly choose to enter the Collin County Detention Facility.

## 1.55 E-Verify

- A. Contractors doing business with OWNER agree to comply with Federal Executive Order 13465 E-Verify. It is OWNER's intention and duty to comply and support the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verification and non-discrimination. According to the INA, contractors/employers may hire only persons who may legally work in the United States. Subsequently, contractors and subcontractors doing business with OWNER must confirm their enrollment in the E-Verify system which verifies employment eligibility through completion and checking of I-9 forms. OWNER reserves the right to audit contractors' process to verify enrollment compliance.

## 1.56 INSURANCE REQUIREMENTS

### A. CONTRACTOR'S INSURANCE

1. Everything that follows under insurance requirements is applicable to all subcontractors. Contractor will have discretion to determine coverage limits for its subcontractors for the required insurances.
2. Before commencing work, the CONTRACTOR shall be required to furnish the Collin County Purchasing Agent with certified copies of all insurance certificate(s) required by Texas Law, and the coverages required herein, indicating the coverage is to remain in force throughout the term of this Contract. CONTRACTOR shall also be required to furnish the Collin County Purchasing Agent with certified copies of subcontractor's insurance certificates required by the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b), and coverages required herein in section 4.2. Without limiting any of the other obligations or liabilities of the CONTRACTOR, during the term of the Contract the CONTRACTOR and each subcontractor at their own expense shall purchase and maintain the herein stipulated minimum insurance with companies duly approved to do business in the State of Texas and satisfactory to the OWNER. Certificates required of each policy for the CONTRACTOR and each subcontractor shall be delivered to the OWNER before any work is started, along with a written statement from the issuing company stating that said policy shall not be canceled, nonrenewed or materially changed without 30 days advance written notice being given to the OWNER.
3. In addition to any coverage required by Texas Law, the CONTRACTOR shall provide the following coverages at not less than the specified amounts:
  - a. Workers Compensation insurance required by Texas Law at statutory limits, including employer's liability coverage of not less than \$1,000,000. In addition to these, the

CONTRACTOR must comply with all the requirements of the Texas Department of Insurance, Division of Workers' Compensation; section 406.096(b); (Note: If you have questions concerning these requirements, you are instructed to contact the DWC.)

- i. By signing this contract or providing or causing to be provided a certificate of coverage, the CONTRACTOR is representing to the OWNER that all employees of the CONTRACTOR and its subcontractors who will provide services on the Project will be covered by workers compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.
  - ii. The CONTRACTOR'S failure to comply with any of these provisions is a breach of Contract by the Contractor which entitles the OWNER to declare the Contract void if the CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from the OWNER.
- b. Broad form commercial general liability insurance, including independent contractor's liability, completed operations and contractual liability, written on an occurrence form, covering, but not limited to, the liability assumed under the indemnification provisions of this contract, fully insuring CONTRACTOR'S and its subcontractors liability for injury to or death of OWNER'S employees and third parties, extended to include personal injury liability coverage with damage to property, with minimum limits as set forth below:
- i. General Aggregate \$2,000,000
  - ii. Products — Components/Operations Aggregate \$2,000,000
  - iii. Personal and Advertising Injury \$ 1,000,000
  - iv. Each Occurrence \$ 2,000,000
  - v. Contractor's Pollution Liability \$1,000,000/\$3,000,000 (Occurrence Form)
  - vi. The policy shall include coverage extended to apply to completed operations, asbestos hazards (if this project involves work with asbestos) and XCU (explosion, collapse and underground) hazards. The completed operations coverage must be maintained for a minimum of one year after final completion and acceptance of the work, with evidence of same filed with OWNER.

- c. Comprehensive automobile and truck liability insurance, covering owned, hired and non-owned vehicles, with a combined bodily injury and property damage minimum limit of \$1,000,000 per occurrence; or separate limits of \$1,000,000 for bodily injury (per person), \$1,000,000 for bodily injury (per accident) and \$1,000,000 for property damage. Such insurance shall include coverage for loading and unloading hazards.
  - d. OWNER'S PROTECTIVE LIABILITY INSURANCE
    - i. CONTRACTOR shall obtain, pay for and maintain at all times during the prosecution of the work under this contract an OWNER'S protective liability insurance policy naming the OWNER as insured for property damage and bodily injury, which may arise in the prosecution of the Work or CONTRACTOR'S operations under this Contract. Coverage shall be on an "occurrence" basis, and the policy shall be issued by the same insurance company that carries the CONTRACTOR'S liability insurance with a combined bodily injury and property damage minimum limit of \$1,000,000 per occurrence and \$2,000,000 aggregate. Owner's Protective Liability Insurance required by Contractor only is acceptable.
  - e. "UMBRELLA" LIABILITY INSURANCE
    - i. CONTRACTOR shall obtain, pay for and maintain umbrella liability insurance (over Workers Comp, Auto, and General Liability) during the contract term, insuring CONTRACTOR for an amount of not less than \$2,000,000 per occurrence/\$2,000,000 aggregate limit combined limit for bodily injury and property damage that follows from and applies in excess of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted. OWNER shall be named as an additional insured. Contractor can adjust to lower limits on umbrella liability insurance for its subcontractors.
  - f. RAILROAD PROTECTIVE INSURANCE
    - i. When required in the Special Provisions, CONTRACTOR shall obtain, maintain and present evidence of railroad protective insurance (RPI). The policy shall be in the name of the railroad company having jurisdiction over the right-of-way involved. The minimum limit of coverage shall meet the specifications provided by the railroad company. The OWNER shall specify the amount of RPI necessary.
  - g. BUILDER'S RISK
    - i. CONTRACTOR shall obtain, pay for, and maintain builders risk insurance during the contract term, insuring CONTRACTOR for an amount of not less than the total contract amount.
4. POLICY ENDORSEMENTS AND SPECIAL CONDITIONS

- a. Each insurance policy to be furnished by CONTRACTOR shall include the following conditions by endorsement to the policy:
  - i. each policy shall name the OWNER as an additional insured as to all applicable coverage
  - ii. each policy shall require that 30 days prior to the cancellation, nonrenewal or any material change in coverage, a notice thereof shall be given to OWNER by certified mail;
  - iii. the term "OWNER" shall include all past, present or future, authorities, boards, bureaus, commissions, divisions, departments and offices of the OWNER and individual members, elected official, officers, employees and agents thereof in their official capacities and/or while acting on behalf of the OWNER;
  - iv. the policy phrase "other insurance" shall not apply to the OWNER where the OWNER is an additional insured on the policy;
  - v. all provisions of the contract concerning liability, duty and standard of care together with the indemnification provision, shall be underwritten by contractual liability coverage sufficient to include such obligations within applicable policies;
  - vi. each policy shall contain a waiver of subrogation in favor of OWNER, and its, past, present and future, officials, employees, and volunteers; and
  - vii. each certificate of insurance shall reference the Project and Contract number, contain all the endorsement required herein, and require a notice to the OWNER of cancellation.
- b. Insurance furnished by the CONTRACTOR shall be in accordance with the following requirements:
  - i. any policy submitted shall not be subject to limitations, conditions or restrictions deemed inconsistent with the intent of the insurance requirements to be fulfilled by the CONTRACTOR. The OWNER'S decision thereon shall be final;
  - ii. all policies are to be written through companies duly licensed to transact that class of insurance in the State of Texas with a financial ratings of A+ VII or better as assigned by BEST Rating Company or equivalent; and
  - iii. Surplus lines insurance carriers will be acceptable when surplus lines companies meet all financial requirements and be licensed in their home state. Collin County will take an extra step if a bid comes in to include coverage from a surplus lines carrier to verify if that company is approved by TDI to do business in the state of Texas. Please verify with TDI at the phone number list in below link if your or your proposed surplus lines company is approved before you submit your bid.

<https://www.tdi.texas.gov/pubs/consumer/cb015.html>; and (d) All liability policies required herein shall be written with an “occurrence” basis coverage trigger.

c. CONTRACTOR agrees to the following:

- i. CONTRACTOR hereby waives subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall have no right of recovery or subrogation against the OWNER, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies;
- ii. Companies issuing the insurance policies and CONTRACTOR shall have no recourse against the OWNER for payment of any premiums or assessments for any deductibles, as all such premiums and deductibles are the sole responsibility and risk of the CONTRACTOR;
- iii. Approval, disapproval or failure to act by the OWNER regarding any insurance supplied by the CONTRACTOR (or any subcontractors) shall not relieve the CONTRACTOR of full responsibility or liability for damages and accidents as set forth in the Contract Documents. Neither shall the bankruptcy, insolvency or denial of liability by the insurance company exonerate the CONTRACTOR from liability; and
- iv. No special payments shall be made for any insurance that the CONTRACTOR and subcontractors are required to carry; all are included in the Contract Price and the Contract unit prices. Any of such insurance policies required under this section may be written in combination with any of the others, where legally permitted, but none of the specified limits may be lowered thereby.

## 1.57 BUSINESS WITH A FOREIGN ENTITY

- A. Vendors/Contractors/Providers must be in compliance with the provisions of Section 2252.152 and Section 2252.153 of the Texas Government Code which states, in part, contracts with companies engaged in business with Iran, Sudan, or Foreign Terrorist Organizations are prohibited. A governmental entity may not enter into a contract with a company that is listed on the Comptroller of the State of Texas website identified under Section 806.051, Section 807.051 or Section 2253.253 which do business with Iran, Sudan or any Foreign Terrorist Organization. This Act is effective September 1, 2017.

## 1.58 FORCE MAJEURE

- A. No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, when and to the extent such failure or delay is caused by or results from acts beyond the affected party’s reasonable control, including, without limitation: acts of God; flood, fire or explosion;

war, invasion, riot or other civil unrest; actions, embargoes or blockades in effect on or after the date of this Agreement; or national or regional emergency (each of the foregoing, a “Force Majeure Event”). A party whose performance is affected by a Force Majeure Event shall give notice to the other party, stating the period of time the occurrence is expected to continue and shall use diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.



## 004113 Pricing Table

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
001	Total cost to renovate the Juvenile Probation building located 920 E. Park Boulevard, Plano, Texas per the attached construction documentation. Sum to include all labor and material cost.	1	lump sum		
<b>TOTAL</b>					

**004313 BID BOND**

STATE OF TEXAS §  
COUNTY OF COLLIN §

**KNOW ALL MEN BY THESE PRESENTS:**

**THAT** \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and fully authorized to transact business in the State of Texas, whose address is \_\_\_\_\_ of the City of \_\_\_\_\_ County of \_\_\_\_\_, and State of \_\_\_\_\_, (hereinafter referred to as "Principal"), and \_\_\_\_\_ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of \_\_\_\_\_ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto \_\_\_\_\_ (hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

**SIGNED, SEALED and DATED** this \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_\_.

**WHEREAS**, the Principal is herewith submitting its proposal for IFB 2024-480, Construction, 920 Juvenile Probation Renovation

The condition of the above obligations are such that if the aforesaid Principal shall be awarded the Contract, the said Principal will, within the time required, enter into a Contract and give Bonds, if required, for the faithful performance of the Contract and the prompt payment for labor and materials in the prosecution thereof, then this obligation shall be null and void; otherwise the Principal and Surety will pay unto the OWNER the full penal sum hereof, as liquidated damages, it being difficult and impractical to determine accurately the actual amount of damages occurring to OWNER by reason of Principal's failure to execute said Contract and Bonds.

PROVIDED FURTHER, that if any legal action be filed on this Bond, venue shall lie in \_\_\_\_\_ County, Texas.

The Resident Agent of the Surety for delivery of notice and service of process is:  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**WITNESS**

\_\_\_\_\_

**PRINCIPAL**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

**SURETY**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**NOTE: CERTIFIED COPY OF POWER-OF-ATTORNEY SHOULD BE ATTACHED HERETO.**

**Revised 11/2008**

**SECTION 004325 - PRODUCT SUBSTITUTION REQUEST FORM**

(Must be submitted by date specified in solicitation)

Bidder: \_\_\_\_\_

Project No: **IFB 2024-480**

Project: **Construction, 920 Juvenile Probation Renovation**

Section: \_\_\_\_\_

Article/ Paragraph: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ Proposed Model No.: \_\_\_\_\_

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its installation.

The undersigned warrants and represents:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by substitution.

Submitted By: \_\_\_\_\_

Signed: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

**REVIEW & ACTION (Initial)**

\_\_\_\_\_ Substitution approved - Make submittals in accordance with Project Manual requirements.

\_\_\_\_\_ Substitution approved as noted - Make submittals in accordance with Project Manual requirements.

\_\_\_\_\_ Substitution rejected - Use specified materials.

\_\_\_\_\_ Substitution Request received too late - Use specified materials.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Supporting Data Attached: \_\_\_ Drawings \_\_\_ Product Data \_\_\_ Samples \_\_\_ Tests \_\_\_ Reports \_\_\_ Other

END OF REQUEST FORM

## 004513 Vendor Submissions

### 1. OpenGov Notice\*

Collin County exclusively uses OpenGov Procurement for the notification and dissemination of all solicitations. The receipt of solicitations through any other means may result in your receipt of incomplete specifications and/or addendums which could ultimately render your bid/proposal non-compliant. Collin County accepts no responsibility for the receipt and/or notification of solicitations through any other means. Please initial.

\*Response required

### 2. Contact Information\*

List the contact name, email address and phone number of the main person(s) Collin County should contact in reference to this solicitation. Contact(s) shall be duly authorized by the company, corporation, firm, partnership or individual to respond to any questions, clarification, and or offers in response to this solicitation.

\*Response required

### 3. Exceptions\*

If you take any exceptions to the specifications, you must submit the exception/s as a Question via the public eBid portal before the Question Cutoff Date for County consideration. The County will review and publish a response via eBid. If you would like to offer any substitutions, please review the Instruction to Bidders Document 002113, Section 1.07 and submit by separate attachment. Please initial.

\*Response required

### 4. Calendar Days Bid\*

Please state the consecutive calendar days bid from notice to proceed through completion of project.

\*Response required

### 5. Insurance Acknowledgement\*

I understand that the insurance requirements of this solicitation are required and are included in the submitted pricing. The Contractor shall furnish certificates of insurance for both the Contractor and any subcontractor to the Purchasing department if awarded all or a portion of the resulting contract. Please initial.

\*Response required

### 6. Bid Bond Acknowledgement\*

I understand that accompanying this bid, is a certified check, cashier's check or Bid Bond in the amount of five percent (5%) of the total amount bid. Bidders submitting a bid via OpenGov Procurement shall upload a Bid Bond at <https://procurement.opengov.com/portal/collincountytx>. Regardless of delivery method, all Bid Bonds shall be received prior to the bid opening time to be considered.

I understand that the **original** Bid Bond shall be received in the Collin County Purchasing Department no later than close of business on the third working day after the bid opening. **Late receipt of original Bid Bond shall be cause for rejection of bid.** Please initial.

\*Response required

## 7. Bid Bond

### Part 1 (Scanned and Upload)

Cashier's check, certified check, or bid bond payable to the order of the Collin County, TX, of not less **five percent (5%)** of the bid in said amount, payable to the Collin County, TX and signed by the bidder as well as a corporate surety, shall accompany the bid

**Please scan and upload a copy of your bid bond/cashier's check.**

or

### Part 2 (Mail or Hand Deliver)

Bidder must also MAIL or hand deliver bid guarantee with a postmarked date no later than 2:00 pm on Thursday, March 6, 2025 addressed to:

#### **Collin County Purchasing**

2300 Bloomdale Road, **Ste. 3160**

McKinney, TX 75071

Please have the following listed clearly on the outside of the envelope:

- A. Bidder Name,
- B. Bid Bond" for 920 Juvenile Probation Renovation
- C. Contract Number 2024-480
- D. Date/time of the bid opening
- E. "DO NOT OPEN WITH REGULAR MAIL"

**\*\*\*The Bid shall include the bid bond both uploaded into OpenGov Procurement and hard copy original mailed or hand delivered to the purchasing office no later than the close of business on the third working day after the bid opening, otherwise the bid will be deemed non-responsive.\*\*\***

- [004313 Bid Bond.doc](#)

## 8. Bonding Requirement Acknowledgement\*

I understand that the bonding requirements of this solicitation are required and are included in the submitted pricing. A bond certificate (payment, performance, and/or maintenance) as stated in the specification

document shall be submitted to the Purchasing department if I am awarded all or a portion of the resulting contract. Please initial.

\*Response required

## 9. Subcontractors\*

State the business name of all subcontractors and the type of work they will be performing under this contract. If you are fully qualified to self-perform the entire contract, please respond with "Not Applicable-Self Perform".

\*Response required

## 10. Reference No. 1\*

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references are preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail. It is the responsibility of the Bidder/Proposer to ensure submitted references will be responsive to the County's requests. The County reserves the right to contact references other than those listed, and to consider any information acquired from all references during the evaluation process.

\*Response required

## 11. Reference No. 2\*

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references are preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail. It is the responsibility of the Bidder/Proposer to ensure submitted references will be responsive to the County's requests. The County reserves the right to contact references other than those listed, and to consider any information acquired from all references during the evaluation process.

\*Response required

## 12. Reference No. 3\*

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references are preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail. It is the responsibility of the Bidder/Proposer to ensure submitted references will be responsive to the County's requests. The County reserves the right to contact references other than those listed, and to consider any information acquired from all references during the evaluation process.

\*Response required

## 13. Preferential Treatment\*

The County of Collin, as a governmental agency of the State of Texas, may not award a contract to a nonresident bidder unless the nonresident's bid is lower than the lowest bid submitted by a responsible Texas

resident bidder by the same amount that a Texas resident bidder would be required to underbid a nonresident bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located or a state in which the nonresident is a resident manufacturer.(Government Code, Title 10, V.T.C.A., Chapter 2252, Subchapter A).

1. Is your principal place of business in the State of Texas?
2. If your principal place of business is not in Texas, in which State is your principal place of business?
3. If your principal place of business is not in Texas, does your state favor resident bidders (bidders in your state) by some dollar increment or percentage?
4. If your state favors resident bidders, state by what dollar amount or percentage.

\*Response required

#### 14. Debarment Certification\*

I certify that neither my company nor an owner or principal of my company has been debarred, suspended or otherwise made ineligible for participation in Federal Assistance programs under Executive Order 12549, "Debarment and Suspension," as described in the Federal Register and Rules and Regulations. Please initial.

\*Response required

#### 15. Immigration and Reform Act\*

I declare and affirm that my company is in compliance with the Immigration and Reform Act of 1986 and all employees are legally eligible to work in the United States of America. I further understand and acknowledge that any non-compliance with the Immigration and Reform Act of 1986 at any time during the term of this contract will render the contract voidable by Collin County. Please initial.

\*Response required

#### 16. Information Regarding Conflicts of Interests\*\*

During the 79th Legislative Session, House Bill 914 was signed into law effective September 1, 2015, which added Chapter 176 to the Texas Local Government Code. Recent changes have been made to Chapter 176 pursuant to HB23, which passed the

84th Legislative Session. Chapter 176 mandates the public disclosure of certain information concerning persons doing business or seeking to do business with Collin County, including family, business, and financial relationships such persons may have with Collin County officers or employees involved in the planning, recommending, selecting and contracting of a vendor for this procurement.

For a copy of Form CIQ and CIS: <https://www.ethics.state.tx.us/forms/conflict/>

The vendor acknowledges by doing business or seeking to do business with Collin County that they have been notified of the requirements under Chapter 176 of the Texas Local Government Code and that they are solely

responsible for complying with the terms and conditions therein. Furthermore, any individual or business entity seeking to do business with Collin County who does not comply with this practice may risk award consideration of any County contract.

For a listing of current Collin County Officers: <https://www.collincountytx.gov/Contact/county-officials>

At the time of this solicitation being released, the following are known to be involved in the planning, recommending, selecting, and/or contracting for the attached procurement:

Construction and Projects:

Yoon Kim - County Administrator

Sandeep Kathuria - Director of Building Projects

Rickee Harris - Building Projects Coordinator

Purchasing:

Michelle Charnoski, NIGP-CPP, CPPB – Purchasing Agent

Marci Chrismon, CPPB – Assistant Purchasing Agent

Glenn Snodderly - Senior Buyer

Commissioners Court:

Chris Hill – County Judge

Susan Fletcher – Commissioner Precinct No. 1

Cheryl Williams – Commissioner Precinct No. 2

Darrell Hale – Commissioner Precinct No. 3

Duncan Webb – Commissioner Precinct No. 4

\*Response required

## 17. Disclosure of Certain Relationships\*

Chapter 176 of the Texas Local Government Code requires that any vendor considering doing business with a local government entity disclose the vendor's affiliation or business relationship that might cause a conflict of interest with a local government entity. Subchapter 6 of the code requires a vendor to file a conflict of interest questionnaire (CIQ) if a conflict exists. By law this questionnaire must be filed with the records administrator of Collin County no later than the 7th business day after the date the vendor becomes aware of an event that requires the statement to be filed. A vendor commits an offense if the vendor knowingly violates the code. An offense under this section is a misdemeanor. By submitting a response to this request, the vendor represents



that it is in compliance with the requirements of Chapter 176 of the Texas Local Government Code. Please send completed forms to the Collin County County Clerk's Office located at 2300 Bloomdale Rd., Suite 2104, McKinney, TX 75071. Please initial.

\*Response required

### 18. Anti-Collusion Statement\*

Bidder certifies that its Bid/Proposal is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a Bid/Proposal for the same materials, services, supplies, or equipment and is in all respects fair and without collusion or fraud. No premiums, rebates or gratuities permitted; either with, prior to, or after any delivery of material or provision of services. Any such violation may result in Agreement cancellation, return of materials or discontinuation of services and the possible removal from bidders list. Please initial.

\*Response required

### 19. Disclosure of Interested Parties\*

Section 2252.908 of the Texas Government Code requires a business entity entering into certain contracts with a governmental entity to file with the governmental entity a disclosure of interested parties at the time the business entity submits the signed contract to the governmental entity. Section 2252.908 requires the disclosure form (Form 1295) to be signed by the authorized agent of the contracting business entity, acknowledging that the disclosure is made under oath and under penalty of perjury. Section 2252.908 applies only to a contract that requires an action or vote by the governing body of the governmental entity before the contract may be signed or has a value of at least \$1 million. Section 2252.908 provides definitions of certain terms occurring in the section. Section 2252.908 applies only to a contract entered into on or after January 1, 2016. Please initial.

\*Response required

### 20. Notification Survey\*

In order to better serve our offerors, the Collin County Purchasing Department is conducting the following survey. We appreciate your time and effort expended to submit your bid. Should you have any questions or require more information please call (972) 548-4165. How did you receive notice of this request?

- OpenGov Notification
- Plano Star Courier
- Plan Room
- Collin County Website
- Other

\*Response required

### 21. Critical Infrastructure Affirmation\*

Pursuant to section 2274.0102 of the Texas Government Code, Respondent certifies that neither it nor its parent company, nor any affiliate of Respondent or its parent company, is: (1) majority owned or controlled by

citizens or governmental entities of China, Iran, North Korea, Russia, or any other country designated by the Governor under Government Code Section 2274.0103, or (2) headquartered in any of those countries. Please initial.

\*Response required

## 22. Energy Company Boycotts\*

Pursuant to Section 2274.002 of the Texas Government Code, should the contract have a value of \$100,000 or more and the company employs 10 or more full-time employees, Respondent represents and warrants that: (1) it does not, and will not for the duration of the contract, boycott energy companies, and (2) will not boycott energy companies during the term of the contract. If circumstances relevant to this provision change during the course of the contract, Respondent shall promptly notify Agency. Please initial.

\*Response required

## 23. Firearm Entities and Trade Associations Discrimination\*

Pursuant to section 2274.002 of the Texas Government Code, should the contract have a value of \$100,000 or more and the company employs 10 or more full-time employees, Respondent verifies that: (1) it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and (2) will not discriminate during the term of the contract against a firearm entity or firearm trade association. If circumstances relevant to this provision change during the course of the contract, Respondent shall promptly notify Agency. Please initial.

\*Response required

## 24. Construction Acknowledgement\*

Bidder, declares that the only person or parties interested in this bid are those principals named herein, that his/her bid is made without collusion with any other person, firm or corporation, that he/she has carefully examined the Contract Documents including the Advertisement for Bids, Instruction to Bidders, Construction Agreement, Specifications and the Drawings, therein referred to and has carefully examined the locations, conditions and classes of materials for the proposed work, and agrees that he/she will provide all the necessary labor, machinery, tools, equipment, apparatus and other items incidental to construction and will do all the work and furnish all the materials called for in the Contract Documents in the manner prescribed therein. Bidder hereby declares that he/she has visited the site of the Work and has carefully examined the Contract Documents pertaining to the Work covered by the above Bid, and he/she further agrees to commence work within ten (10) consecutive calendar days after date of written Notice to Proceed and to substantially complete the work on which he/she has bid within the number of days specified subject to such extensions of time allowed by Specifications. Bidder certifies that the bid prices contained in this bid have been carefully checked and are submitted as correct and final. The prices have been shown in words and figures for each item listed in this bid and it is understood that in the event of a discrepancy, the words shall govern. Please initial.

\*Response required

# CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

## OFFICE USE ONLY

Date Received

**1** Name of vendor who has a business relationship with local governmental entity.

**2**  Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

**3** Name of local government officer about whom the information is being disclosed.

\_\_\_\_\_  
Name of Officer

**4** Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes       No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes       No

**5** Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

**6**  Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

**7**

\_\_\_\_\_  
Signature of vendor doing business with the governmental entity

\_\_\_\_\_  
Date

## **CONFLICT OF INTEREST QUESTIONNAIRE**

### **For vendor doing business with local governmental entity**

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

**Local Government Code § 176.001(1-a):** "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

**Local Government Code § 176.003(a)(2)(A) and (B):**

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

\*\*\*

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed;  
or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

**Local Government Code § 176.006(a) and (a-1)**

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

## 005213 CONSTRUCTION AGREEMENT

THIS CONSTRUCTION AGREEMENT is made and entered into by and between \_\_\_\_\_, a \_\_\_\_\_ corporation (hereinafter referred to as “Contractor”), and COLLIN COUNTY, TEXAS, a political subdivision of the State of Texas (hereinafter referred to as “County” or “OWNER”), to be effective from and after the date hereinafter provided.

For and in consideration of the covenants and agreements contained herein, and for the mutual benefits to be obtained hereby, the parties hereto agree as follows:

### CONTRACT SUM

The County shall pay the Contractor in current funds for the performance of the work, subject to additions and deductions by Change orders as provided in the Contract Documents. The contract sum shall be the amount of \_\_\_\_\_ (\$\_\_\_\_\_).

### EFFECTIVE DATE

This Construction Agreement, having been previously approved by the Commissioners’ Court of Collin County, Texas, shall be effective upon the date of delivery and execution by Contractor, provided the County executes the same within five (5) consecutive calendar days after said delivery and execution by Contractor.

## I. CONTRACT GENERAL PROVISIONS

### 1.1 DEFINITIONS

Words which have well-known technical or construction industry meanings shall have their commonly understood meanings in the Contract Documents, unless a different meaning is stated in the Contract Documents. The following words and expressions, or pronouns used in their place, shall wherever they appear in this contract be construed as follows, unless a different meaning is clear from the context:

**Addendum, Bulletin or Letter of Clarification:** Any additional contract provisions, or change, revisions or clarification of the Contract Documents issued in writing by the OWNER, to prospective bidders prior to the receipt of bids.

**Contract or Contract Documents:** The written agreement covering the performance of the work. The Contract and Contract Documents include this written Construction Agreement between OWNER and CONTRACTOR, Advertisement for Bids, Instructions to Bidders, Requests for Proposal, all Addenda, the Specifications, including the general and supplemental special and technical conditions, Drawings, provisions, plans or working drawings — and any supplemental changes or agreements pertaining to the Work or materials therefor; and bonds and any additional documents incorporated by reference in the above.

**CONTRACTOR:** The person, persons, partnership, firm, corporation, association or organization, or any combination thereof, entering into the contract for the execution of the work, acting directly or through a duly authorized representative.

**Other CONTRACTORS:** Any contractor, other than the CONTRACTOR or his subcontractors, who has a direct contact with the OWNER for work on or adjacent to the site of the work.

**Contract Work or Work:** Everything expressly or impliedly required to be furnished and done by the CONTRACTOR by the Contract Documents.

**Architect:** The term “Architect” means the Architect or his duly authorized representative. The Architect shall be understood to be the Architect of the OWNER, and nothing contained in the Contract Documents shall create any contractual or agency relationship between the Architect and the CONTRACTOR.

**Extra Work:** Work other than that which is expressly or impliedly required by the Contract Documents at the time of the execution of the contract.

**Change Order:** A written order to the CONTRACTOR authorizing and directing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or the Contract time.

**Contract Price:** The total amount of money payable to the CONTRACTOR under the terms and conditions of the Contract Documents. When used in such context, it may also mean the unit price of an item of work under the Contract terms.

**OWNER’S Representative:** The Architect or other duly authorized assistant, agent, Architect, inspector or superintendent acting within the scope of their particular duties.

**Drawings or Contract Drawings:** Those drawings that are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, including but not limited to, the plans, elevations, sections, details, schedules, diagrams, any bulletin, or any detailed drawing furnished by the OWNER, pertaining or supplemental thereto.

**Specifications:** Those portions of the Contract Documents that specify the requirements for materials, equipment, systems, standards and workmanship for performance of the Work, and related services.

**Inspector:** Any representative of the OWNER designated to inspect the work.

**Materialman or Supplier:** Any subcontractor contracting with the CONTRACTOR, or any of his subcontractors, to fabricate or deliver or who actually fabricates or delivers materials, supplies or equipment to be consumed or incorporated into the Work.

**Notice:** Written notice effective the date of the postmark thereon, or if hand delivered, effective the date of hand delivery.

**OWNER:** COLLIN COUNTY, TEXAS, a political subdivision of the State of Texas. The term OWNER means the OWNER or its authorized representative.

**Payment Bond:** A bond in the amount of the Contract executed by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects as security furnished by the CONTRACTOR and his sureties solely for the protection of payment bond beneficiaries supplying labor and materials in the prosecution of the Contract Work.

**Performance Bond:** A bond in the amount of the Contract executed by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects as security furnished by the CONTRACTOR and his sureties solely for the protection of the Owner, conditioned on the faithful performance of the Contract Work in accordance with the plans, specification, and Contract Documents.

**Maintenance Bond:** A bond executed by a corporate surety for 10% of the Contract Price that complies with all Texas Laws, including but not limited to, Chapter 3503 of the Texas Insurance Code, guaranteeing the prompt, full and faithful performance of the general guaranty and warranty contained in the Contract Documents, and Texas Law.

**Project:** The total construction of the work described in the Contract Documents performed by the Contractor, Other Contractor or the Owner in whole or part.

**Proposal:** The written statement or statements duly submitted to the OWNER by the person, persons, partnership, company, firm, association or corporation proposing to do the Work contemplated, including the approved form on which the formal bids for the Work are to be proposed.

**Plan, or Plans:** The plans are the drawings or reproductions therefrom made by the Owner or Owner's Representative and approved by the Owner showing the dimensions, location, design and position of the various elements of the Project and Work, including plans, elevations, sections, details, schedules, diagrams, working drawings, preliminary drawings, and such supplemental drawings as the Owner may issue to clarify other drawings or for the purpose of showing changes in the Contract Work authorized by the Owner, or for showing details not shown therein.

**Special Provisions or Conditions:** The special clauses of the Contract, or Contract Documents, setting forth conditions or requirements peculiar to the specific Project involved, supplementing the standard or general specifications and taking precedence over any conditions or requirements of the standard or general specifications with which they are in conflict.

**Specifications or Contract Specifications:** All of the general, special and technical conditions or provisions, and all addendum or supplements thereto consisting of

written requirements for materials, equipment, systems, standards and performance of the work.

**Site:** The area upon or in which the CONTRACTOR'S operations are carried on, and such other areas adjacent thereto as may be designated as such by the OWNER.

**Subcontractors:** Any persons, firm or corporation, other than employees of the CONTRACTOR, who or which contracts with the CONTRACTOR to furnish, or who actually furnishes, labor and/or materials and equipment at or about the site.

**Sureties:** The corporate bodies which are bound by such bonds as are required with and for the CONTRACTOR. The sureties engaged to be responsible for the entire and satisfactory fulfillment of the Contract and for any and all requirements as set out in the specifications, Contract or plans.

**The Work:** All work including the furnishing of all labor, materials, tools, equipment, required submittals and incidentals to be performed by the CONTRACTOR under the terms of the Contract.

**Directed, Required, Approved and Words of Like Import:** Whenever they apply to the Work or its performance, the words "directed," "required," "permitted," "ordered," "designated," "established," "prescribed" and words of like import used in the Contract, specifications or upon the drawings shall imply the direction, requirement, permission, order, designation or prescription of the OWNER; and "approved," "acceptable," "satisfactory" and words of like import shall mean approved by, acceptable to or satisfactory to the OWNER.

**Equal:** Materials, articles or methods which are of equal or higher quality than those specified or shown on the drawings and as further defined in the "or equal" clause. Substitution of Materials shall be determined by the Architect at his or her discretion, and approved by the Owner.

**Working Time, Completion Time or Contract Time:** The time set forth in the Contract for the performance and completion of the Work contracted for. The time may be expressed as calendar days, working days or a specific date.

**Calendar Day or Days:** Any successive days of the week or month, no days being excepted.

**Working Day:** A working day is defined as a calendar day not including Saturdays, Sundays or those legal holidays as specified in the list prepared by the OWNER for contract purposes. Nothing in this definition shall be construed as prohibiting the CONTRACTOR from working on Saturdays if he so desires, however permission of the OWNER shall be necessary if the CONTRACTOR chooses to work on Saturday. Work on Sundays shall not be permitted without the written permission of the OWNER. If Saturday or Sunday work is permitted, working time shall be charged on the same basis as week days. Where the working time is expressed as calendar days



or a specific date, the concept of working days shall no longer be relevant to the contract.

## **CONTRACT DOCUMENTS**

1.2 The parties agree that the Contract Documents shall consist of the following documents in addition to any other documents referenced or incorporated herein:

- A. This written Construction Agreement, including any changes or modifications;
- B. All addenda including the following listed and numbered addenda:  
Addendum No. 1 dated \_\_\_\_\_ Received \_\_\_\_\_  
Addendum No. 2 dated \_\_\_\_\_ Received \_\_\_\_\_
- C. Advertisement for Bids, Instructions to Bidder, the Invitation to Bid and Bid Form;
- D. The Special/Supplemental Conditions;
- E. The Specifications and the Project Drawings (if any);
- F. The Construction Details shown on plans;
- G. The Standard Specifications and Standard Drawings from the Public Works Construction Standards-North Central Texas Council of Governments, 2004 edition and all subsequent addendums;
- H. The Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, as adopted by the Texas Department of Transportation on November 1, 2014, hereinafter referred to as the "Texas Standard Specifications";
- I. The Performance Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract Price;
- J. The Payment Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract Price; and,
- K. The Maintenance Bond in the sum of TEN PERCENT (10%) of the total Contract Price.

### 1.2.1 PRIORITY OF THE CONTRACT DOCUMENTS

These Contract Documents (A through K above) form the Construction Agreement and are a part of this Construction Agreement as if fully set forth herein. In the event of an inconsistency in any of the provisions of the Contract Documents, the inconsistency shall be resolved by giving precedence to the Contract Documents in the order in which they are listed above.

### 1.2.2 THE CONTRACT

The Contract Documents form the Contract. The Contract represents the entire integrated agreement between the OWNER and the CONTRACTOR and supersedes all prior negotiations, and representations by either party.

## 1.3 CORRELATION AND INTENT OF DOCUMENTS

The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. The intent of the documents, unless otherwise specifically provided, is to produce complete and finished work, which the CONTRACTOR undertakes to do in full compliance with the Contract Documents. It is not intended to mention every item of work in the specifications which can be adequately shown on the drawings nor to show on the drawings all items of work described or required by the specifications. All materials or labor for work shown on the drawings or reasonably inferable therefrom as being necessary to produce a finished job shall be provided by the CONTRACTOR whether or not same is expressly covered in the specifications. No verbal conversation, understanding or agreement with any officer or employee or agent of the OWNER, either before or after the execution of the Contract, shall affect or modify any of the terms, conditions or obligations contained in the Contract Documents.

### 1.3.1 CONTRACT DRAWINGS AND SPECIFICATIONS

The OWNER shall furnish the CONTRACTOR one copy of the Contract Drawings and any supplemental drawings and specifications reasonably necessary for the proper execution of the work. At least one copy of all drawings and specifications shall be accessible at all times to the OWNER at the job site.

### 1.3.2 SUPPLEMENTAL DRAWINGS AND SPECIFICATIONS

In order to carry out the intent of the Contract Documents and to assist the CONTRACTOR in performing its work, the OWNER, after the execution of the Contract, may, by supplemental drawings, specifications or otherwise, furnish additional information or instructions as may be necessary for construction purposes.

All such supplemental drawings, specifications or instructions are intended to be consistent with the Contract Documents and reasonably inferable therefrom. Therefore, no extra costs shall be allowed by the OWNER on a claim that particular supplemental drawings, specifications or instructions differ from the requirements of the Contract Documents, incurring extra costs, unless the CONTRACTOR has first brought the matter, in writing, to the OWNER'S attention for adjustment before proceeding with the work covered by such.

If the OWNER decides that there is no departure from the requirements of the Contract Documents, the CONTRACTOR shall then proceed with the work as shown, specified or directed. If the OWNER shall decide that Extra Work is involved, he shall so modify the supplemental drawings, specifications or instructions to eliminate the Extra Work, or cause a written Change Order to be issued in accordance with the Contract Documents.

### 1.3.3 ERRORS AND CORRECTIONS IN DRAWINGS AND SPECIFICATIONS

The CONTRACTOR shall not take advantage of any apparent errors, omissions or discrepancies in the drawings or specifications; and the Architect shall be permitted to make such corrections or interpretations as may be necessary for the fulfillment of the intent of the Contract Documents. In case of any errors, omissions or discrepancies in the drawings or specifications, the CONTRACTOR shall promptly submit the matter to the OWNER or OWNER'S Representative in writing who, in turn, shall promptly make a determination and issue the necessary instructions in writing. Any adjustment by the CONTRACTOR without this determination and instructions shall be at the CONTRACTOR'S own risk and expense. The Work is to be made complete as intended by the Contract Documents.

### 1.3.4 EXISTING STRUCTURES

The plans show the general locations of some known surface and subsurface structures. The locations of many gas mains, water mains, conduits, sewers, other utilities, etc., however, are unknown, and the OWNER assumes no responsibility for failure to show any or all of these structures on the plans or to show them in their exact locations. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for Extra Work or for increasing the pay quantities in any manner whatsoever. The CONTRACTOR shall be solely responsible for locating all gas mains, water mains, conduits, sewers, other utilities etc., so as to perform the Work without damaging the same.

## II. THE WORK

### 2.1 SCOPE OF WORK

Contractor shall provide all labor, supervision, materials, and equipment necessary to perform all work required by the Contract Documents in connection with **(Bid #, Bid Title)**

### 2.2 CHANGE OR MODIFICATION OF CONTRACT

#### 2.2.1 ALTERATION OF PLANS AND SPECIFICATIONS

The OWNER reserves the right to make such changes in the plans and specifications and in the character of the work as may be necessary or desirable to insure completion in the most satisfactory manner, provided such changes do not materially alter the original plans and specifications or change the general nature of the Work as a whole. Such changes shall not be considered as waiving or invalidating any condition or provision of the Contract or bonds. Such changes shall be issued by the Architect.

#### 2.2.2 INCREASED OR DECREASED QUANTITIES OF WORK

The OWNER reserves the right and may from time to time, by written order, and without notice to any surety, make changes in the quantity or time of performance of the Work, as may be considered necessary or desirable and such changes shall not be considered as waiving or invalidating any conditions or provisions of the Contract or bonds. The CONTRACTOR shall perform all the Contract Work in strict compliance with the Contract Documents, and shall not make any changes to the Work without prior written authorization from the OWNER, in the form of a written Change Order. If such changes increase or decrease either the cost or the time necessary for the performance of the Work, then the parties will mutually agree upon an equitable adjustment to the price or time to perform the Work pursuant to the terms of the Contract.

### 2.2.3 EXTRA WORK/CHANGE ORDERS

When any work is necessary to the proper completion of the Project and for which no prices are provided for in the Bid or Proposal and Contract, the CONTRACTOR shall do such work, but only when and as ordered in writing by the OWNER. The OWNER may order changes in the Work without invalidating Contract. Payment for Extra Work shall be made as provided herein. Contractor agrees that overhead and profit for Extra Work shall not exceed 10% of the total cost of the Extra Work. The Contractor shall not be entitled to any additional funds for any work or Extra Work performed on the Project, unless a Change Order is issued and signed by the Owner. The CONTRACTOR shall perform the work as altered, whether increased or decreased, and no allowances shall be made for anticipated profits. Nothing in this section shall give rise to any claims for any delay or acceleration damages, and the CONTRACTORS sole remedy for any delays in the Project shall remain an equitable extension of time as provided for in the Contract Documents. CONTRACTOR acknowledges and agrees to waive all rights or claims for compensation for any additional or other work not specifically authorized by the OWNER.

## 2.3 DISPUTED WORK AND CLAIMS FOR ADDITIONAL COMPENSATION

If the CONTRACTOR is of the opinion that (a) the work necessary or required to accomplish the result intended by this Contract, or (b) any work ordered to be done as Contract Work by the OWNER is Extra Work and not Contract Work, or (c) any determination or order of the OWNER violates the terms and provisions of this Contract, the CONTRACTOR shall promptly, either before proceeding with such work or complying with such order or determination, notify the OWNER in writing of his contentions with respect thereto and request a final determination thereof.

Such determination of the OWNER shall be given in writing to the CONTRACTOR. If the OWNER determines that the work in question is Extra Work and not Contract Work, or that the order complained of requires performance by the CONTRACTOR beyond that required by the Contract or violates the terms and provisions of the Contract, thereupon the OWNER shall cause either (a) the issuance of a written Change Order covering the Extra Work as provided herein, or

(b) the determination or order complained of to be rescinded or so modified so as to not require performance beyond that required by the terms and provisions of the Contract.

If the OWNER determines that the work in question is Contract Work and not Extra Work, or that the determination or order complained of does not require performance by the CONTRACTOR beyond that required by the Contract or violate the terms and provisions of the Contract, he shall direct the CONTRACTOR to proceed, and the CONTRACTOR must promptly comply. In order to reserve his right to claim compensation for such work resulting from such compliance, however, the CONTRACTOR must, within 20 calendar days after receiving the OWNER'S determination and direction, notify the OWNER in writing that the work is being performed, or that the determination and direction is being complied with, under protest.

If the CONTRACTOR fails to so appeal to the OWNER for a determination or, having so appealed, should the CONTRACTOR thus fail to notify the OWNER in writing of his protest, the CONTRACTOR shall be deemed to have waived any claim for extra compensation or damages therefore. No oral appeals or oral protests, no matter to whom made, shall be deemed even substantial compliance with the provisions of this item.

In addition to the foregoing requirements, the CONTRACTOR shall, upon notice from the OWNER, produce for examination for a minimum period of three (3) years following final payment or termination of contract and audit at the CONTRACTOR'S office, by the representatives of the OWNER, all his books and records showing all of his acts and transactions in connection with contractual performance as well as relating to or arising by reason of the matter in dispute. At such examination a duly authorized representative of the CONTRACTOR may be present.

Unless the aforesaid requirements and conditions are complied with by the CONTRACTOR, the OWNER shall be released from all claims arising under, relating to or by reason of disputed work or Extra Work. It is further stipulated and agreed that no conduct on the part of the OWNER or any agent or employee of the OWNER shall ever be construed as a waiver of the requirements of this section, when such requirements constitute an absolute condition precedent to any approval of any claim for extra compensation, notwithstanding any other provisions of the Contract Documents; and in any action against the OWNER to recover any sum in excess of the contract amount, the CONTRACTOR must allege and prove strict compliance with the provisions of this section. The CONTRACTOR ASSUMES THE RISK OF NONPAYMENT, for failing to comply with any of the requirements of this section.

### **III. CONTRACTORS RESPONSIBILITIES**

#### **3.1 CONTRACTOR'S REPRESENTATIONS, WARRANTIES AND ASSURANCES.**

In consideration of, and to induce the award of this contract to him, the CONTRACTOR represents and warrants: (a) That he is financially solvent, and sufficiently experienced and competent to perform the work; (b) That the facts stated in the proposal and the information given by him pursuant to the bidding documents are true and correct in all respects; (c) That he has read, understood and complied with all the requirements set forth in the bidding documents; (d) That he is familiar with and understands all laws and regulations applicable to the work; and (e) unless otherwise specifically provided for in the Contract Documents, the CONTRACTOR shall do all the Work and shall furnish all the tools, equipment, machinery, materials, labor and appliances, except as herein otherwise specified, necessary or proper for performing and completing the work required by this Contract, in the manner and within the time herein prescribed.

By executing the contract, the CONTRACTOR represents that he has visited the site of Work, has fully familiarized himself with the local and on-site conditions under which the work is to be performed and has correlated his observation with the requirements of the Contract Documents. In addition, the CONTRACTOR represents that he has satisfied himself as to subsurface conditions at the site of the Work. Information, data and representations contained in the Contract Documents pertaining to the conditions at the site, including subsurface conditions, are for information only and are not warranted or represented in any manner to accurately show the conditions at the site of the Work. The CONTRACTOR agrees that he shall make no claims for damages, additional compensation or extension of time against the OWNER because of encountering actual conditions in the course of the Work which vary or differ from conditions or information contained in the Contract Documents. All risks of differing subsurface conditions shall be borne solely by the CONTRACTOR.

The CONTRACTOR shall carefully study and compare the Contract Documents and shall at once report to the OWNER any error, inconsistency or omission he may discover. The CONTRACTOR shall perform no portion of the Work at any time without Contract Documents or, where required, approved shop drawings, product data or samples for such portion of the work.

#### 3.1.1 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop drawings are drawings, diagrams, schedules and other data specially prepared for the work by the CONTRACTOR or any subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the CONTRACTOR to illustrate a material, product or system for some portion of the work.

C. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the work shall be judged.

D. the CONTRACTOR shall provide, review, approve and submit to the Architect with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the OWNER or any separate contractor, all shop drawings, product data and samples required by the Contract Documents. The Work will be performed in accordance with submittals approved by the Architect. The CONTRACTOR shall not be relieved responsibility for deviations from the requirements of the Contract Documents by errors or omissions by the OWNER or Architect in approving Shop Drawings, Product Data, samples or any other submittals.

E. By approving and submitting shop drawings, product data and samples, the CONTRACTOR represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or shall do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

F. As the Architect's review is only for general conformance with the requirements of the Contract Documents, the CONTRACTOR shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of shop drawings, product data or samples unless the CONTRACTOR has specifically informed the Architect in writing of such deviation at the time of submission and the Architect have given written approval to the specific deviation. The CONTRACTOR shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's approval thereof. The CONTRACTOR shall direct specific attention, in writing or on resubmitted shop drawings, product data or samples, to revisions other than those requested by the Architect on previous submittals.

G. the CONTRACTOR shall be responsible for delays caused by rejection of the submittal of inadequate or incorrect shop drawings, product data or samples. The CONTRACTOR shall be responsible for seeing that any "approved" copies of shop drawings bearing the approval of the Architect are allowed on the job site. The CONTRACTOR shall be responsible for providing all copies of approved shop drawings necessary for the construction operations.

H. the CONTRACTOR shall keep adequate records of submittal and approvals so that an accurate up-to-date record file is maintained at the job site at all times.

I. No portion of the work requiring submission of a shop drawing, product data or sample shall be commenced until the submittal has been approved

by the Architect. All such portions of the work shall be in accordance with approved submittals.

### 3.1.2 SURETY BONDS

With the execution and delivery of the contract, the CONTRACTOR shall furnish and file with the OWNER in the amounts herein required, the surety bonds specified hereunder. Without exception, the OWNER'S bond forms, attached hereto as Section 00610 and 00611 must be used, and exclusive venue for any lawsuit in connection with such bonds shall be specified as the county in which the OWNER'S principal office is located. Such surety bonds shall be in accordance with Texas Law, including but not limited to, the provisions of Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code. These bonds shall automatically be increased by the amount of any change order or supplemental agreement which increases the contract price with or without notice to the surety, but in no event shall a change which reduces the contract amount reduce the penal amount of such bonds.

A. Performance Bond. A good and sufficient bond in an amount not less than 100 percent (100%) of the total amount of the Contract Price guaranteeing the full and faithful execution of the Work and performance of the Contract in accordance with the plans, specifications and Contract Documents, including any extensions thereof, for the protection of the OWNER. This bond shall provide for the repair and/or replacement of all defects due to faulty materials and workmanship that appear within a period of one year from the date of completion and acceptance of the improvement by the OWNER or such lesser or greater period as may be designated in the Contract Documents.

B. Payment Bond. A good and sufficient bond in an amount not less than 100 percent (100%) of the total amount of the Contract Price guaranteeing the full and proper protection of all payment bond beneficiaries and claimants supplying labor and material in the prosecution of the work provided for in said Contract and for the use of each claimant.

C. Maintenance Bond. A good and sufficient bond in an amount not less than ten percent (10%) of the total amount of the Contract Price guaranteeing the project against defects.

D. Sureties. No sureties shall be accepted by the OWNER who are now in default or delinquent on any bonds or who are interested in any litigation against the OWNER. All bonds shall be made on forms furnished by the OWNER and shall be executed by not less than one corporate surety authorized to do business in the State of Texas and acceptable to the OWNER. The sureties shall be listed in the most current Federal Register Treasury List. Each bond shall be executed by the CONTRACTOR and surety. Each surety shall designate an agent resident in the OWNER'S



jurisdictional area acceptable to the OWNER to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship. The OWNER reserves the right to reject any and all sureties.

E. Additional or Substitute Bonds. If at any time the OWNER is or becomes dissatisfied with any surety, then upon the performance or payment bond, the CONTRACTOR shall, within five days after notice from the OWNER to do so, substitute an acceptable bond (or bonds), or provide an additional bond, in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such bonds shall be paid by the CONTRACTOR without recourse to the OWNER. No further payments under the contract shall be deemed due or payable until the substitute or additional bonds shall have been furnished and accepted by the OWNER.

### 3.1.3 PERMITS AND FEES

The CONTRACTOR shall secure and pay for all building permits and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are normally and legally required for the construction of similar projects in the State of Texas. The CONTRACTOR will give all notices required by laws, ordinances, rules, regulations and lawful orders of authorized public authorities required for the proper and legal performance of the Work.

### 3.14 CONTRACT DOCUMENTS AT SITE

The CONTRACTOR shall keep and maintain at the Project site one record copy of the Contract Documents, including but not limited to, the Drawings, Specifications, addenda, Change Orders, submittals, Product Data, Samples and other modifications, in good order and marked to show the current construction of the Project. These documents shall be available to the OWNER or Architect to review at any time and shall be submitted to the OWNER upon completion of the Project, along with a complete set of as built drawings.

## 3.2 CONTRACTOR'S RESPONSIBILITIES

### 3.2.1 PERFORMANCE OF THE WORK

In addition to those matters elsewhere expressly made the responsibility of the CONTRACTOR, the CONTRACTOR shall have the full and direct responsibility for the performance and completion of the Work under this Contract and for any act or neglect of the CONTRACTOR, his agents, employees or subcontractors. He shall bear all losses, if any, resulting on account of the amount and character of the Work, or because the conditions under which the work must be done are different from what were estimated

or anticipated by him, or because of weather, floods, elements or other causes.

### 3.2.2 MEANS AND METHODS OF CONSTRUCTION

Unless otherwise expressly provided in the contract drawings, specifications or bulletins, the means and methods of construction shall be such as the CONTRACTOR may choose; subject, however, to the OWNER'S right to prohibit means and methods proposed by the CONTRACTOR which in the OWNER'S judgment:

- A. shall constitute a hazard to the Work, or to persons or property, or shall violate express requirements of applicable laws or ordinances; or
- B. shall cause unnecessary or unreasonable inconvenience to the public; or
- C. shall not produce finished work in accordance with the requirements of the Contract Documents; or
- D. shall not assure the Work to be completed within the time allowed by the contract.

The OWNER'S approval of the CONTRACTOR'S means or methods of construction, or the OWNER'S failure to exercise his right to prohibit such means or methods, shall not relieve the CONTRACTOR of his responsibility for the Work or of his obligation to accomplish the result intended by the Contract Documents; nor shall the exercise or non-exercise of such rights to prohibit create a cause of action for damages or provide a basis for any claim by the CONTRACTOR against the OWNER. The CONTRACTOR shall be solely responsible for, the construction means and methods, techniques, sequences, procedures, and for the safety precautions and programs in connection with the Work or the Project.

If the Contract Documents specify any means, methods, techniques, sequences or procedures, the CONTRACTOR shall evaluate said specifications and determine that they are safe for the proper prosecution of the Work. The CONTRACTOR shall be solely responsible for the job site safety of such means, methods, techniques, sequences or procedures. If the CONTRACTOR determines the specified means, methods, techniques, sequences or procedures may not be safe, the CONTRACTOR shall immediately notify the OWNER and Architect and shall not proceed without further instructions.

### 3.2.3 CONSTRUCTION SCHEDULE

The CONTRACTOR, immediately after being awarded the contract, shall prepare and submit for the OWNER, and Architect's information an estimated progress schedule for the work. The progress schedule shall be

related to the entire Project to the extent required by the Contract Documents and shall provide for expeditious and reasonable execution of the work, not to exceed the time limits for completion provided in the Contract Documents. The progress schedule shall be updated as the Work proceeds or the schedule changes and immediately upon request by the OWNER. The CONTRACTOR shall also prepare a schedule of submittals that allows for a reasonable time for the OWNER or Architect to review the submittals so as not to delay the Project.

#### 3.2.4 TIME OF PERFORMANCE OF THE WORK

The CONTRACTOR shall begin the work to be performed under this Contract not later than 10 days from the date specified in the purchase or work order and shall conduct the work in such a manner and with sufficient equipment, material and labor as is necessary to insure its completion within the working time. It is the intent of this specification to provide a continuous construction operation without delay except as occasioned by unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, and it shall be the CONTRACTOR's responsibility to execute the work in the most expeditious manner.

Work shall be done only during the regular and commonly accepted and prescribed working hours. No work shall be done on nights, Sundays or regular holidays unless permission is given by the OWNER

Time is of the Essence for the performance of the Work by the CONTRACTOR. CONTRACTOR agrees that the time allotted for the performance of the Work is reasonable.

#### 3.2.5 PERFORMANCE OF EXTRA OR DISPUTED WORK

While the CONTRACTOR or his subcontractor is performing Extra Work in accordance with the OWNER'S written order, the cost of which is to be determined on a time and material basis, or is performing disputed work or complying with a determination or order under protest, the CONTRACTOR shall, on the Monday following the performance of the work, furnish the OWNER'S representative at the site with three copies of verified statements showing:

A. the name, address and telephone number of each workman employed on such Extra Work or engaged in complying with such determination or order, the character of Extra Work each is doing and the wages paid to him, including the rate and amount of payroll taxes, contributions for insurance, and federal social security; and

B. the nature, cost and quantity of any materials, plant equipment or construction equipment furnished or used in connection with the performance of such Extra Work or in complying with such

determination or order, and from whom purchased or rented, along with copies of invoices for such materials, plant equipment or construction equipment.

The CONTRACTOR and his subcontractors, when required by the OWNER, must also produce for inspection for a minimum period of three (3) years following final payment or termination of contract, produce for examination and audit by designated OWNER representatives, any and all of his books, vouchers, records, daily job diaries and reports, canceled checks, etc. showing the nature and quantity of labor, materials and equipment actually used in the performance of the Extra Work; the amounts expended therefore; and the costs incurred for insurance premiums and other items of expense directly chargeable to such Extra Work. The CONTRACTOR must permit the OWNER'S representatives to make extracts therefrom or copies thereof as may be desired.

Failure of the CONTRACTOR to comply strictly with the requirements of this section shall constitute a waiver of any claim for extra compensation on account of the performance of such Extra Work.

### 3.3 QUALITY OF WORK

#### 3.3.1 INSPECTION AND TESTS

The CONTRACTOR shall furnish the OWNER with every reasonable accommodation and opportunity to ascertain whether or not the work performed is in accordance with the requirements and intent of the plans and specifications. Any work done or materials used without suitable inspection by the OWNER may be ordered removed and replaced at the CONTRACTOR'S expense. The CONTRACTOR shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the OWNER in his administration of the contract, or by inspections, tests or approvals required or performed by persons other than the CONTRACTOR.

Unless otherwise provided, the CONTRACTOR shall make arrangements for all tests, inspections and approvals with an independent testing laboratory or entity required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction over the Work or items to be tested, inspected or approved. If additional testing or inspection is required they shall be performed at the CONTRACTOR'S expense.

#### 3.3.2 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

All work which has been rejected or condemned shall be repaired, or if it cannot be repaired satisfactorily, it shall be removed and replaced at the CONTRACTOR'S expense. Defective materials shall be immediately

removed from the site of the work. Work done without line and grade having been given, work done beyond the lines or not in conformity with the grades shown on the plans or as given, save as herein provided, work done without written authority and prior agreement in writing as to process, shall be done at the CONTRACTOR'S risk and shall be considered unauthorized and at the option of the OWNER may be ordered removed at the CONTRACTOR'S expense.

Upon failure of the CONTRACTOR to repair satisfactorily or to remove and replace, if so directed, rejected, unauthorized or condemned work or materials immediately after receiving notice from the OWNER, the OWNER shall, after giving written notice to the CONTRACTOR, have the authority to cause defective work to be remedied or removed and replaced, or to cause unauthorized work to be removed and to deduct the cost thereof from any monies due or to become due the CONTRACTOR. Alternatively, the OWNER may, at its option, declare the CONTRACTOR in default.

### 3.3.3 WORKING AREA; COORDINATION WITH OTHER CONTRACTORS; FINAL CLEANUP

The CONTRACTOR shall confine his equipment, storage of materials and construction operations to the area shown on the contract drawings or stated in the specifications, prescribed by ordinance, laws, or permits or as may be directed by the OWNER, and shall not unreasonably encumber the site or public right-of-way with his construction equipment, plant or materials.

Such area shall not be deemed for the exclusive use of the CONTRACTOR. Other contractors of the OWNER may enter upon and use such portions of the area and for such items as determined by the OWNER are necessary for all purposes required by their contracts. The CONTRACTOR shall give to such other contractors all reasonable facilities and assistance to the end that the work on this and other contracts shall not be unduly or unreasonably delayed. Any additional areas desired by the CONTRACTOR for his use shall be provided by him at his own cost and expense.

The CONTRACTOR is responsible for cutting, fitting or patching any parts of the Work where such work is necessary to make the Work complete, for parts to fit together, or for any damage to the Work prior to Final Acceptance.

The CONTRACTOR shall keep the Project and the surrounding area clean and free from the accumulation of waste materials or trash. Upon completion of the work and before final acceptance and final payment shall be made, the CONTRACTOR shall completely clean and remove from the site of the work surplus and discarded materials, temporary structures and debris of every kind. He shall leave the site of the work in a neat and orderly condition equal to that which originally existed, or as called for in the

Contract Documents. Surplus and waste materials removed from the site of the work shall be disposed of at locations satisfactory to the OWNER, and at the CONTRACTOR'S sole cost.

### 3.4 LEGAL RESPONSIBILITIES

#### 3.4.1. PATENTS AND COPYRIGHTS

The CONTRACTOR shall pay all royalties and license fees and shall provide, by suitable legal agreement with the patentee or owner, for the use of any design, device, material or process covered by letters, patent or any copyright. The CONTRACTOR shall indemnify, defend, hold and save the OWNER and its officers, employees and agents harmless from all liability and claims for infringement of any patent or copyright.

In the event that any claims, suit or action at law or in equity of any kind whatsoever is brought against the OWNER, or its officers, employees or agents involving any such patents, copyrights or license rights, then the OWNER shall have the right to and may retain from any money due or to become due to the CONTRACTOR such sum deemed necessary by the OWNER for its protection until such claim or suit shall have been settled and satisfactory evidence to that effect shall have been furnished the OWNER.

#### 3.4.2 INDEMNIFICATION

To the fullest extent permitted by law, the CONTRACTOR and his sureties shall indemnify, defend and hold harmless the OWNER and all of its, past, present and future, officers, agents and employees from all suits, cause of action, claims, liabilities, losses, fines, penalties, liens, demands, obligations, actions, proceedings, of any kind, character, name and description brought or arising, on account of any injuries or damages received or sustained by any person, destruction or damage to any property on account of, in whole or part, the operations of the CONTRACTOR, his agents, employees or subcontractors; or on account of any negligent act or fault of the CONTRACTOR, his agents, employees or subcontractors in the execution of said Contract; failing to comply with any law, ordinance, regulation, rule or order of any governmental or regulatory body including those dealing with health, safety, welfare or the environment; on account of the failure of the CONTRACTOR to provide the necessary barricades, warning lights or signs; and shall be required to pay any judgment, with cost, which may be obtained against the OWNER growing out of such injury or damage. In no event shall OWNER be liable to CONTRACTOR for indirect or consequential damages or loss of income or profit irrespective of the cause, fault or reason for same. CONTRACTOR'S duty to indemnify herein shall not be limited by any limitation on the type or amount of damages payable by or for CONTRACTOR or any Subcontractor under

workman's compensation acts, disability benefit acts or any other employee benefit acts.

In addition, the CONTRACTOR likewise covenants and agrees to, and does hereby, indemnify and hold harmless the OWNER from and against any and all injuries, loss or damages to property of the OWNER during the performance of any of the terms and conditions of this Contract, arising out of or in connection with or resulting from, in whole or in part, any and all alleged acts or omissions of officers, agents, servants, employees, contractors, subcontractors, licenses or invitees of the CONTRACTOR.

The rights and responsibilities provided in this indemnification provision shall survive the termination or completion of this Contract.

### 3.5 SUPERVISION AND CONSTRUCTION PROCEDURES

#### 3.5.1. SUPERVISION BY CONTRACTOR

The status of the CONTRACTOR is that of an independent CONTRACTOR under Texas law and the work under this Contract shall be under the direct charge and superintendence of the CONTRACTOR. Except where the CONTRACTOR is an individual and gives his personal superintendence to the work, the CONTRACTOR shall provide a competent superintendent or general foreman on the work site at all times during progress with full authority to act for the CONTRACTOR. The CONTRACTOR shall also provide an adequate staff for the coordination and expediting of the Work.

The superintendent and staff shall be satisfactory to the OWNER. The superintendent or general foreman shall not be changed during this Contract except with the written consent of the OWNER or unless the superintendent or general foreman proves unsatisfactory to the CONTRACTOR and ceases to be in his employ.

If the superintendent should be or become unsatisfactory to the OWNER, he shall be replaced by the CONTRACTOR upon written direction of the OWNER, and in such event, the CONTRACTOR shall not be entitled to file a claim for any additional working time or money from the OWNER.

#### 3.5.2 EMPLOYEES

The CONTRACTOR shall employ only competent, efficient workmen and shall not use on the work any unfit person or one not skilled in the work assigned to him and shall at all times maintain good order among its employees. Whenever the OWNER shall inform the CONTRACTOR in writing that, in his opinion, any employee is unfit, unskilled, disobedient, or is disrupting the orderly progress of the work, such employee shall be

removed from the work and shall not again be employed on it. Under urgent circumstances, the OWNER may orally require immediate removal of an employee for cause, to be followed by written confirmation.

The CONTRACTOR shall supervise and direct all the work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences, procedures and safety procedures and for coordinating all portions of the Work under the Contract. The CONTRACTOR shall be responsible to the OWNER for the acts and omissions of his employees, subcontractors and their agents, employees and subcontractors performing any of the work under a contract with the CONTRACTOR.

### 3.5.3 LABOR AND MATERIALS

Unless otherwise provided in the Contract Documents, the CONTRACTOR shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services necessary for the proper execution and completion of the work, whether temporary or permanent and whether or not incorporated or to be incorporated into the work.

The CONTRACTOR shall at all times enforce strict discipline and good order among his employees and shall not employ on the work site any unfit person or anyone not skilled in the task assigned to him.

The rate of progress shall be such that the whole work shall be performed and the premises cleaned up in accordance with the Contract within the working time established in the Contract, unless an extension of time is made in the manner hereinafter specified.

### 3.5.4 WAGE SCALE

In accordance with The Texas Government Code, Title 10, Chapter 2258, Prevailing Wage Rates, the general prevailing wage rate has been determined for this locality for the craft or type of workman needed to execute work of a similar character of the project listed herein. The Contractor shall pay the prevailing wage rate in this locality to all his/her employees and subcontractors performing work on this project, and in no event shall the Contractor pay less than the rate shown in the following schedule.

General Decision Number: TX180035 01/05/2018 TX35

Superseded General Decision Number: TX20170035

State: Texas

Construction Type: **Highway**



Counties: Archer, Callahan, Clay, Collin, Dallas, Delta, Denton, Ellis, Grayson, Hunt, Johnson, Jones, Kaufman, Parker, Rockwall, Tarrant and Wise Counties in Texas.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/05/2018

\* SUTX2011-007 08/03/2011

	Rates	Fringes
CONCRETE FINISHER (Paving and Structures).....	\$ 14.12	
ELECTRICIAN.....	\$ 19.80	
FORM BUILDER/FORM SETTER		
Paving & Curb.....	\$ 13.16	
Structures.....	\$ 13.84	
LABORER		
Asphalt Raker.....	\$ 12.69	
Flagger.....	\$ 10.06	
Laborer, Common.....	\$ 10.72	
Laborer, Utility.....	\$ 12.32	
Pipelayer.....	\$ 13.24	
Work Zone Barricade		
Servicer.....	\$ 11.68	
POWER EQUIPMENT OPERATOR:		
Asphalt Distributor.....	\$ 15.32	
Asphalt Paving Machine.....	\$ 13.99	

Broom or Sweeper.....	\$ 11.74
Concrete Pavement	
Finishing Machine.....	\$ 16.05
Concrete Saw.....	\$ 14.48
Crane Operator, Lattice	
Boom 80 Tons or Less.....	\$ 17.27
Crane Operator, Lattice	
Boom over 80 Tons.....	\$ 20.52
Crane, Hydraulic 80 Tons	
or Less.....	\$ 18.12
Crawler Tractor.....	\$ 14.07
Excavator, 50,000 pounds	
or less.....	\$ 17.19
Excavator, over 50,000	
pounds.....	\$ 16.99
Foundation Drill , Truck	
Mounted.....	\$ 21.07
Foundation Drill, Crawler	
Mounted.....	\$ 17.99
Front End Loader 3 CY or	
Less.....	\$ 13.69
Front End Loader, over 3 CY.	\$ 14.72
Loader/Backhoe.....	\$ 15.18
Mechanic.....	\$ 17.68
Milling Machine.....	\$ 14.32
Motor Grader, Fine Grade....	\$ 17.19
Motor Grader, Rough.....	\$ 16.02
Pavement Marking Machine....	\$ 13.63
Reclaimer/Pulverizer.....	\$ 11.01
Roller, Asphalt.....	\$ 13.08
Roller, Other.....	\$ 11.51
Scraper.....	\$ 12.96
Small Slipform Machine.....	\$ 15.96
Spreader Box.....	\$ 14.73
Servicer.....	\$ 14.58
Steel Worker (Reinforcing).....	\$ 16.18
TRUCK DRIVER	
Lowboy-Float.....	\$ 16.24
Off Road Hauler.....	\$ 12.25
Single Axle.....	\$ 12.31
Single or Tandem Axle Dump	
Truck.....	\$ 12.62
Tandem Axle Tractor with	
Semi Trailer.....	\$ 12.86
Transit-Mix.....	\$ 14.14

WELDER.....\$ 14.84

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the

Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average

rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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#### WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Except for work on legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) the number of hours worked per day, except for overtime hours, times (b) the above respective rate per hour.

For legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on the legal holiday.

For overtime work, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on overtime.

Under the provisions of Texas Government Code, Title 10, Chapter 2258, Prevailing Wage Rates, the contractor or subcontractor of the contractor shall forfeit as a penalty to the entity on whose behalf the contract is made or awarded, sixty dollars (\$60.00) for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the contract.

If the construction project involves the expenditure of Federal funds in excess of \$2,000, the minimum wages to be paid various classes of laborers and mechanics will be based upon the wages that will be determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on the project of a character similar to the Contract Work.

- 3.5.5 Contractors doing business with OWNER agree to comply with Federal Executive Order 13465 E-Verify. It is OWNER'S intention and duty to comply and support the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verification and non-discrimination. According to the INA, contractors/employers may hire only persons who may legally work in the United States. Subsequently, contractors and subcontractors doing business with OWNER must confirm their enrollment in the E-Verify system which verifies employment eligibility through completion and checking of I-9 forms. OWNER reserves the right to audit contractors process to verify enrollment compliance.

### 3.5.6 COMPLIANCE WITH LAWS

The CONTRACTOR shall fully comply with all local, state and federal laws, including all codes, ordinances and regulations applicable to this Contract and the Work to be done thereunder, which exist or which may be enacted later by governmental bodies having jurisdiction or authority for such enactment.

All work required under this Contract is intended to comply with all requirements of law, regulation, permit or license. If the CONTRACTOR finds that there is a variance, he shall immediately report this to the OWNER for resolution.

#### 3.5.6.1 EQUAL EMPLOYMENT OPPORTUNITY

The CONTRACTOR shall comply with all local, state and federal employment and discrimination laws and shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, national origin or any other class protected by law.

### 3.5.7 RAILWAY CROSSINGS

Where the Work encroaches upon any right-of-way of any railway, the OWNER shall secure the necessary easement for the work. Where railway tracks are to be crossed, the CONTRACTOR shall observe all the regulations and instructions of the railway company as to methods of doing the work or precautions for safety of property and the public. All negotiations with the railway company, except for right-of-way, shall be made by the CONTRACTOR. The railway company shall be notified by the CONTRACTOR not less than five days prior to commencing the work.

The CONTRACTOR shall not be paid separate compensation for such railway crossing but shall receive only the compensation as set out in the proposal.

### 3.5.8 OTHER CONTRACTORS; OBLIGATION TO COOPERATE

The OWNER reserves the right to perform construction on the Project with its own forces or may award other contracts for additional work on this Project, and the CONTRACTOR shall fully cooperate with such other contractors and shall coordinate and fit his work to be done hereunder to such additional work as may be contracted by the OWNER. The CONTRACTOR shall not commit or permit any act which shall interfere with the performance of work by any other contractor.

Upon receiving written notice from the CONTRACTOR that the OWNER or another contractor is failing to coordinate his work with the Work under this Contract as directed by the OWNER, the OWNER shall promptly investigate the charge and take such necessary action as the situation may require. However, the OWNER shall not be liable to the CONTRACTOR for damages suffered by the CONTRACTOR due to the fault or negligence of another contractor or through failure of another contractor to carry out the directions of the OWNER. Should any interference occur between contractors, the Architect may furnish the CONTRACTOR with written instructions designating priority of effort, whereupon the CONTRACTOR shall immediately comply with such direction. In such event, the CONTRACTOR shall be entitled to an extension of working time only for unavoidable delays verified by the Architect; however, no increase in the Contract Price shall be due the CONTRACTOR.

### 3.5.9 SUBCONTRACTS

The CONTRACTOR shall not make any subcontract for performing any portion of the Work included in the contract without written notice to the OWNER. This contract having been made pursuant to the bid submitted by the CONTRACTOR and in reliance with the CONTRACTOR'S personal qualifications and responsibility, the OWNER reserves the right to withhold approval of any subcontractor which the OWNER may deem would not be in the OWNER'S best interest.

The CONTRACTOR shall, as soon as practicable after signing the Contract, submit a separate written notice to the OWNER identifying each proposed subcontractor. Upon request of the OWNER, the CONTRACTOR shall promptly furnish additional information tending to establish that any proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the OWNER determines that any proposed subcontractor is unacceptable, he shall so notify the CONTRACTOR, who may thereupon submit another proposed subcontractor unless the CONTRACTOR decides to do the work himself. Disapproval by the OWNER of any proposed subcontractor shall not provide a basis for any claim by the CONTRACTOR.

If an approved subcontractor fails to properly perform the work undertaken, he shall be removed from the job upon request of the OWNER, following notification to the CONTRACTOR in writing of the request for removal and the reasons therefore.

Each subcontract entered into shall provide that the provisions of this Contract shall apply to such subcontractor and his officers and employees in all respects as if he and they were employees of the CONTRACTOR. The OWNER'S decision not to disapprove of any subcontract shall not relieve the CONTRACTOR of any of his responsibilities, duties and liabilities hereunder. The CONTRACTOR shall be solely responsible for the acts, omissions, negligence or defaults of his subcontractors and of such subcontractor's officers, agents and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the CONTRACTOR to the extent of his subcontract.

The CONTRACTOR agrees to bind each subcontractor and each subcontractor agrees to be bound by the terms of the Contract Documents insofar as applicable to his work. The CONTRACTOR and each subcontractor jointly and severally agree that nothing in the Contract Documents or otherwise shall create or be deemed to create any rights in favor of a subcontractor against the OWNER; nor shall be deemed or construed to impose upon the OWNER any obligation, liability or duty to a subcontractor; or to create any contractual relation whatsoever between a subcontractor and the OWNER.

The provisions contained herein shall likewise apply to any sub-subcontracts.

### 3.6 PROTECTION OF WORK AND OF PERSONS AND PROPERTY

#### 3.6.1 PROTECTION OF WORK

During performance and up to date of final acceptance, the CONTRACTOR shall be under the absolute obligation to protect the finished work against any damage, loss or injury. In the event of such damage, loss or injury, the CONTRACTOR shall promptly replace or repair such work, whichever the OWNER shall determine to be preferable. The obligation to deliver finished work in strict accordance with the Contract prior to final acceptance shall be absolute and shall not be affected by the OWNER'S approval of or failure to prohibit means and methods of construction used by the



CONTRACTOR. All risk of loss or damage to the work shall be borne solely by the CONTRACTOR until final completion and acceptance of all work by the OWNER, as evidenced by the OWNER'S issuance of a certificate of acceptance.

### 3.6.2 PROTECTION OF PERSONS AND PROPERTY

The CONTRACTOR shall have the responsibility to provide and maintain all warning devices and take all precautionary measures required by law or otherwise to protect persons and property while said persons or property are approaching, leaving or within the work site or any area adjacent to said work site. No separate compensation shall be paid to the CONTRACTOR for the installation or maintenance of any warning devices, barricades, lights, signs or any other precautionary measures required by law or otherwise for the protection of persons or property.

The CONTRACTOR shall assume all duties owed by the OWNER to the general public in connection with the general public's immediate approach to and travel through the work site and the area adjacent to said work site.

Where the work is carried on in or adjacent to any street, alley, sidewalk, public right-of-way or public place, the CONTRACTOR shall at his own cost and expense provide such flagmen and watchmen and furnish, erect and maintain such warning devices, barricades, lights, signs and other precautionary measures for the protection of persons or property as may be prudent or necessary, or as are required by law. The CONTRACTOR'S responsibility for providing and maintaining flagmen, watchmen, warning devices, barricades, signs and lights and other precautionary measures shall not cease until the project shall have been completed and accepted by the OWNER, and shall cease when the certificate of acceptance is issued by the OWNER pursuant to the Contract Documents.

If the OWNER discovers that the CONTRACTOR has failed to comply with the applicable federal and state law (by failing to furnish the necessary flagmen, warning devices, barricades, lights, signs or other precautionary measures for the protection of persons or property), the OWNER may order the CONTRACTOR to take such additional precautionary measures as required by law to be taken to protect persons and property.

In addition, the CONTRACTOR shall be held responsible for all damages to the work and other public or private property due to the failure of warning devices, barricades, signs, lights or other precautionary measures in protecting said property; and whenever evidence is found of such damage, the OWNER may order the damaged portion immediately removed and replaced by and at the cost and expense of the CONTRACTOR.

### 3.6.3 SAFETY; TRENCH SAFETY; UNDERGROUND UTILITY SAFETY; PUBLIC CONVENIENCE AND SAFETY;

The CONTRACTOR shall be responsible for complying with state laws and federal regulations relating to safety, trench safety, and underground utility safety, including those which may be enacted during the performance under this Contract. The CONTRACTOR shall comply with the provisions of The Standard Specifications and Standard Drawings from the Public Works Construction Standards-North Central Texas Council of Governments, 2004 edition and all subsequent addendums and the Instructions to Bidders regarding trench safety, public convenience and safety, and sanitary provisions. The CONTRACTOR shall be solely responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work and the Project.

#### 3.6.4 STORM WATER PROTECTION

The Contractor shall perform, track, participate, implement, and comply with storm water pollution prevention minimum control measures, protocols, and best management practices (BMP) and ensure that water quality standards are not violated in accordance with all regulations and policies as they apply to the Texas Pollutant Discharge Elimination System general permits. Applicable permits include: 1) Texas Construction General Permit (TXR150000).

Contractors will obtain permit coverage for construction activities disturbing over one acre of land (total acreage is cumulative across all portions of the project). BMPs include, but are not limited to:

- Preparing and implementing a site-specific Storm Water Pollution Prevention Plan (SWPPP) as outlined in the permit and prior to any soil disturbance.
- Installing and managing erosion and sediment control.
- Make available, upon request, permit associated documentation.
- Practicing spill prevention and good housekeeping.
- Meeting the requirements of the MS4 permit.

### 3.7 MATERIALS AND WORKMANSHIP; WARRANTIES AND GUARANTEES

Unless otherwise expressly provided in the contract drawings or specifications, the work shall be performed in accordance with the best modern practice with materials and workmanship of the highest quality and suitable for their purpose. The OWNER shall judge and determine the CONTRACTOR'S compliance with these requirements.

#### 3.7.1 MATERIALS AND EQUIPMENT

The CONTRACTOR shall be free to secure the approved materials, equipment and articles from sources of his own selection. However, if the OWNER finds that the work shall be delayed or adversely affected in any way because a selected source of supply cannot furnish a uniform product

in sufficient quantity and at the time required and a suitable source does exist, or the product is not suitable for the Work, the OWNER shall have the right to require the original source of supply changed by the CONTRACTOR. The CONTRACTOR shall have no claim for extra cost or damage because of this requirement.

The CONTRACTOR warrants to the OWNER that all materials and equipment furnished under this contract shall be new unless otherwise specified in the Contract Documents and that same shall be of good quality and workmanship, free from faults and defects and in conformance with the Contract Documents. All materials and equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and shall be promptly repaired or replaced by the CONTRACTOR at the CONTRACTOR's sole cost upon demand of the OWNER. If required by the OWNER, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

#### 3.7.1.1 "OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the plans, by using the name of a proprietary product or of a particular manufacturer or vendor, any material or article which the Architect determines shall perform adequately the duties imposed by the general design or which the Architect deems to be of similar appearance (in cases where appearance is of importance) shall be considered equal and satisfactory, provided the material or article so proposed is of equal substance and function. Authorization for any substitution of materials or articles must be obtained by the CONTRACTOR from the Architect before proceeding with such substitution.

B. Should an authorized substitution require redesign of a portion of the work or alterations to the plans or specifications in order for the materials or articles which are to be substituted to properly fit or in other ways to be satisfactory, the Architect shall accomplish such redesigns and alterations. The CONTRACTOR shall bear all reasonable costs associated with redesign and alteration efforts performed by the Architect.

#### 3.7.2 WORKMANSHIP

The CONTRACTOR shall promptly correct or replace all work rejected by the OWNER as defective or as failing to conform to the Contract Documents whether observed before or after substantial completion and whether or not fabricated, installed or completed. The CONTRACTOR

shall bear all costs of correcting such rejected work, including costs incurred for additional services made necessary thereby.

### 3.8 WARRANTIES

#### 3.8.1 SPECIAL WARRANTY

If within one year after final acceptance of the work by the OWNER, as evidenced by the final certificate of acceptance or within such longer or shorter period of time as may be prescribed by law or by the terms of any other applicable special warranty on designated equipment or portions of work as required by the Contract Documents, any of the work is found to be defective or not in accordance with the Contract Documents, the CONTRACTOR shall correct it promptly after receipt of a written notice from the OWNER to do so. This obligation shall survive termination or completion of the Contract. The OWNER shall give such notice promptly after discovery of the condition.

The CONTRACTOR shall remove from the site all portions of the work which are defective or nonconforming and which have not been corrected unless removal is waived in writing by the OWNER.

#### 3.8.2 SUBCONTRACTORS' AND MANUFACTURERS' WARRANTIES

All subcontractors', manufacturers' and suppliers' warranties and guarantees, express or implied, respecting any part of the work and any materials used therein, shall be obtained and enforced by the CONTRACTOR for the benefit of the OWNER without the necessity of separate transfer or assignment thereof.

#### 3.8.3 CORRECTED WORK WARRANTY

Any work repaired or replaced, pursuant to this section, shall be subject to the provisions of this section to the same extent as work originally performed.

#### 3.8.4 RIGHTS AND REMEDIES

The rights and remedies of the OWNER provided in this section are in addition to, and do not limit, any rights or remedies afforded to the OWNER by law or any other provision of the Contract Documents, or in any way limit the OWNER'S right to recovery of damage due to default under the Contract. No action or inaction by the OWNER shall constitute a waiver of a right or duty afforded it under the Contract.

## IV. INSURANCE

### 4.1 CONTRACTOR'S INSURANCE

Before commencing work, the CONTRACTOR shall be required, to furnish the Collin County Purchasing Agent with certified copies of all insurance certificate(s)

required by Texas Law, and the coverages required herein, indicating the coverage is to remain in force throughout the term of this Contract. CONTRACTOR shall also be required to furnish the Collin County Purchasing Agent with certified copies of subcontractor's insurance certificates required by the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b), and coverages required herein in section 4.2. Without limiting any of the other obligations or liabilities of the CONTRACTOR, during the term of the Contract the CONTRACTOR and each subcontractor, at their own expense, shall purchase and maintain the herein stipulated minimum insurance with companies duly approved to do business in the State of Texas and satisfactory to the OWNER. Certificates of each policy for the CONTRACTOR and each subcontractor shall be delivered to the OWNER before any work is started, along with a written statement from the issuing company stating that said policy shall not be canceled, nonrenewed or materially changed without 30 days advance written notice being given to the OWNER.

In addition to any coverage required by Texas Law, the CONTRACTOR shall provide the following coverages at not less than the specified amounts:

- 4.2 Workers Compensation insurance required by Texas Law at statutory limits, including employer's liability coverage at \$1,000,000. In addition to these, the CONTRACTOR and each subcontractor must comply with all the requirements of the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b); (Note: If you have questions concerning these requirements, you are instructed to contact the DWC.)

By signing this contract or providing or causing to be provided a certificate of coverage, the CONTRACTOR is representing to the OWNER that all employees of the CONTRACTOR and its subcontractors who will provide services on the Project will be covered by workers compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

The CONTRACTOR'S failure to comply with any of these provisions is a breach of Contract by the Contractor which entitles the OWNER to declare the Contract void if the CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from the OWNER.

- 4.3 Broad form commercial general liability insurance, including independent contractor's liability, completed operations and contractual liability, written on an occurrence form, covering, but not limited to, the liability assumed under the indemnification provisions of this contract, fully insuring CONTRACTOR'S and its subcontractors liability for injury to or death of OWNER'S employees and third parties, extended

to include personal injury liability coverage with damage to property, with minimum limits as set forth below:

Per Project Aggregate \$5,000,000

Products — Components/Operations Aggregate \$5,000,000

Personal and Advertising Injury \$ 1,000,000

Each Occurrence \$ 2,000,000

Contractor's Pollution Liability \$1,000,000/\$3,000,000 (Occurrence Form)

4.3.1 The policy shall include coverage extended to apply to completed operations, asbestos hazards (if this project involves work with asbestos) and XCU (explosion, collapse and underground) hazards. The completed operations coverage must be maintained for a minimum of one year after final completion and acceptance of the work, with evidence of same filed with OWNER.

4.4 Comprehensive automobile and truck liability insurance, covering owned, hired and non-owned vehicles, with a combined bodily injury and property damage minimum limit of \$1,000,000 per occurrence; or separate limits of \$1,000,000 for bodily injury (per person), \$1,000,000 for bodily injury (per accident) and \$1,000,000 for property damage. Such insurance shall include coverage for loading and unloading hazards.

#### 4.5 OWNER'S PROTECTIVE LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain at all times during the prosecution of the work under this contract an OWNER'S protective liability insurance policy naming the OWNER as insured for property damage and bodily injury, which may arise in the prosecution of the Work or CONTRACTOR'S operations under this Contract. Coverage shall be on an "occurrence" basis, and the policy shall be issued by the same insurance company that carries the CONTRACTOR'S liability insurance with a combined bodily injury and property damage minimum limit of \$1,000,000 per occurrence and \$2,000,000 aggregate.

#### 4.6 "UMBRELLA" LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain umbrella liability insurance during the contract term, insuring CONTRACTOR for an amount of not less than \$1,000,000 per occurrence combined limit for bodily injury and property damage that follows from and applies in excess of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted. OWNER shall be named as an additional insured.

#### 4.7 RAILROAD PROTECTIVE INSURANCE

When required in the Special Provisions, CONTRACTOR shall obtain, maintain and present evidence of railroad protective insurance (RPI). The policy shall be in the name of the railroad company having jurisdiction over the right-of-way involved. The minimum limit of coverage shall meet the specifications provided by the railroad company. The OWNER shall specify the amount of RPI necessary.

#### 4.8 POLICY ENDORSEMENTS AND SPECIAL CONDITIONS

All policies to be furnished by CONTRACTOR shall include the following conditions by endorsement to the policy:

- A. each policy shall name the OWNER as an additional insured as to all applicable coverage;
- B. each policy shall require that 30 days prior to the cancellation, nonrenewal or any material change in coverage, a notice thereof shall be given to OWNER by certified mail;
- C. the term "OWNER" shall include all past, present or future, authorities, boards, bureaus, commissions, divisions, departments and offices of the OWNER and individual members, elected official, officers, employees and agents thereof in their official capacities and/or while acting on behalf of the OWNER;
- D. the policy phrase "other insurance" shall not apply to the OWNER where the OWNER is an additional insured on the policy;
- E. all provisions of the contract concerning liability, duty and standard of care together with the indemnification provision, shall be underwritten by contractual liability coverage sufficient to include such obligations within applicable policies;
- F. each policy shall contain a waiver of subrogation in favor of OWNER, and its, past, present and future, officials, employees, and volunteers; and,
- G. each certificate of insurance shall reference the Project and Contract number, contain all the endorsement required herein, and require a notice to the OWNER of cancellation.

Insurance furnished by the CONTRACTOR shall be in accordance with the following requirements:

- A. any policy submitted shall not be subject to limitations, conditions or restrictions deemed inconsistent with the intent of the insurance requirements to be fulfilled by the CONTRACTOR. The OWNER'S decision thereon shall be final;
- B. all policies are to be written through companies duly licensed to transact that class of insurance in the State of Texas with a financial ratings of A-VII or better as assigned by BEST Rating Company or equivalent; and
- C. All liability policies required herein shall be written with an "occurrence" basis coverage trigger.

CONTRACTOR agrees to the following:

A. CONTRACTOR hereby waives subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall have no right of recovery or subrogation against the OWNER, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies;

B. Companies issuing the insurance policies and CONTRACTOR shall have no recourse against the OWNER for payment of any premiums or assessments for any deductibles, as all such premiums and deductibles are the sole responsibility and risk of the CONTRACTOR;

C. Approval, disapproval or failure to act by the OWNER regarding any insurance supplied by the CONTRACTOR (or any subcontractors) shall not relieve the CONTRACTOR of full responsibility or liability for damages and accidents as set forth in the Contract Documents. Neither shall the bankruptcy, insolvency or denial of liability by the insurance company exonerate the CONTRACTOR from liability; and

D. No special payments shall be made for any insurance that the CONTRACTOR and subcontractors are required to carry; all are included in the Contract Price and the Contract unit prices. Any of such insurance policies required under this section may be written in combination with any of the others, where legally permitted, but none of the specified limits may be lowered thereby.

## **V. OWNERS RIGHTS AND RESPONSIBILITIES**

### **MONTHLY ESTIMATE, PARTIAL PAYMENTS AND FINAL PAYMENTS**

5.1 Progress and final payments shall be paid to the Contractor based upon the progress of the Project as indicated by the approved Applications for Payment, certificates of acceptance, or Certificates for Payment, that include an approved Schedule of Values that will be submitted by the CONTRACTOR to the OWNER prior to the commencement of the Work and in accordance with the following:

#### 5.2 MONTHLY ESTIMATES

The CONTRACTOR shall deliver to the OWNER an itemized Application for Payment that shall include the work completed, materials stored at the Project site but not incorporated into the work, materials ready to be installed and stored at another agreed location, and the percentage of Work completed, through the 20<sup>th</sup> day of each month, on an Application for Payment with a schedule of values previously submitted by the Contractor and approved by the Owner. Prior to release of funds in connection with any Application for Payment, the Owner may request, and the Contractor must provide, properly executed statements of full or partial releases of claims acceptable to Owner in form and content, for all persons or entities supplying labor or materials to the Project.

5.2.1 The Application for Payment is a representation by the CONTRACTOR to the OWNER that the construction has progressed to the point indicated, the quality of the Work covered by the application is in accordance with the



Contract Documents, and the Contractor is entitled to payment in the amount requested.

#### 5.2.2 INSPECTION AND PARTIAL PAYMENTS

Whenever the CONTRACTOR shall submit an Application for Payment to the OWNER for work performed by the CONTRACTOR, the CONTRACTOR shall notify the Architect that the improvement is ready for inspection. The Architect shall then make such inspection, and will have the authority to reject work that does not conform to the Contract Documents. If the work is satisfactory and in accordance with the specifications and Contract Documents, the Architect shall issue a Certificate for Payment.

5.2.3 Within thirty (30) days of the Owner's receipt of a properly submitted and correct Application for Payment, and the issuance of a Certificate for Payment, the Owner shall make payment to the Contractor, in the amount approved by the Owner less 5% retainage. Such payment shall be adjusted for work that is incomplete or not in accordance with the Contract Documents or that is the subject of a separate contract, or subcontract or supplier claim or lien against the Contractor or the payment bonds for the project.

5.2.4 No partial or final payment or the entire use or occupancy of the Project by the OWNER shall be considered acceptance of work that does not strictly comply with the Contract Documents or release the CONTRACTOR of any of his responsibilities under the Contract.

#### 5.2.5 PAYMENT FOR LABOR AND MATERIAL; NO LIENS

The CONTRACTOR for himself or any of his subcontractors shall pay all indebtedness which may become due to any person, firm or corporation having furnished labor, material or both in the performance of this Contract. It shall be the responsibility of each person, firm or corporation claiming to have furnished labor, materials or both, in connection with this Contract, to protect his or its interest in the manner prescribed by applicable laws of the State of Texas, provided, however, that as this Contract provides for a public works project, no lien of any kind shall ever exist or be placed against the Work or any portion thereof, or any public funds or retainage held by the OWNER; and any subcontractor shall look solely to the CONTRACTOR and the payment bond surety, and not the OWNER, for payment of any outstanding amounts due for labor, materials or any other indebtedness in connection with the Work. However, the OWNER may, at any time prior to making final payment, require the CONTRACTOR to furnish a Consent of Surety to any payment due the CONTRACTOR for completed work and may, at the discretion of the OWNER or the request of the Surety, make the check jointly payable to the CONTRACTOR and the Surety. The Owner shall have no obligation under this Agreement to pay or to be responsible in

any way for payment to any Architect, another design professional, contractor, subcontractor or supplier performing portions of the Work, pursuant to a contract with the Contractor.

#### 5.2.6 PAYMENT WITHHELD

In addition to express provisions elsewhere contained in the contract, the OWNER may withhold from any payment otherwise due the CONTRACTOR such amount as determined necessary to protect the OWNER'S interest, or, if it so elects, may withhold or retain all or a portion of any progress payment or refund payment on account of:

- A. unsatisfactory progress of the Work not caused by conditions beyond the CONTRACTOR'S control,
- B. defective work not corrected,
- C. CONTRACTOR'S failure to carry out instructions or orders of the OWNER or his representative,
- D. a reasonable doubt that the Contract can be completed for the balance then unpaid,
- E. work or execution thereof not in accordance with the Contract Documents,
- F. claim filed by or against the CONTRACTOR or reasonable evidence indicating probable filing of claims,
- G. failure of the CONTRACTOR to make payments to subcontractor or for material or labor,
- H. damage to another contractor,
- I. unsafe working conditions allowed to persist by the CONTRACTOR,
- J. failure of the CONTRACTOR to provide work schedules as required by the OWNER,
- K. use of subcontractors without the OWNER'S approval or,
- L. failure of the CONTRACTOR to keep current as-built record drawings at the job site or to turn same over in completed form to the OWNER.

When the above grounds are removed, payment shall be made for amounts withheld because of them, and OWNER shall never be liable for interest on any delayed or late payment.

#### 5.2.7 PAYMENT FOR EXTRA WORK

The Extra Work done by the CONTRACTOR as authorized and approved by the Architect shall be paid for in the manner hereinafter described, and the compensation thus provided shall be accepted by the CONTRACTOR as payment in full for all labor, materials, tools, equipment and incidentals and all superintendents' and timekeepers' services, all insurance, bond and all other overhead expense incurred in the performance of the Extra Work.

Payment for Extra Work shall be made by one of the following methods:

A. Method “A” — by unit prices agreed on in writing by the OWNER and CONTRACTOR before said Extra Work is commenced, subject to all other conditions of the contract.

B. Method “B” — by lump sum price agreed on in writing by the OWNER and the CONTRACTOR before said Extra Work is commenced, subject to all other conditions of the contract.

#### 5.2.8 SUBSTANTIAL COMPLETION

The Project will be considered substantially complete when the OWNER can utilize the Project for its intended purpose and the Work is in conformance with the Contract Documents.

### 5.3 APPLICATION FOR FINAL PAYMENT.

Upon full performance of all the Contract Work and the full performance of all the provisions of the Contract, the CONTRACTOR shall submit a final application for payment to the OWNER, the CONTRACTOR shall notify the Architect that the improvement is ready for inspection. All warranties and guaranties required of the CONTRACTOR by the Contract Documents shall be assembled and delivered by the CONTRACTOR to the OWNER as Part of the final Application for Payment. The Contractor will assign to the Owner all manufacturer’s warranties relating to materials and labor used in the work and will perform the Work in such a manner as to preserve all such manufacturer’s warranties. The CONTRACTOR will deliver a certificate evidencing that insurance and bonds required by the Contract Documents will remain in full force and effect pursuant to the requirements of the Contract. The final Certificate for Payment will not be issued until all such warranties and guaranties have been received and accepted by the Owner, and a Certificate of Acceptance is issued by the Architect.

#### 5.3.1 FINAL INSPECTION AND ACCEPTANCE

Whenever the improvements provided for by the Contract shall have been completely performed on the part of the CONTRACTOR, the CONTRACTOR shall notify the OWNER, and Architect that the improvement is ready for final inspection. The Architect shall then make such final inspection, and if the work is satisfactory and in accordance with the specifications and Contract Documents, the CONTRACTOR shall be issued a certificate of acceptance.

#### 5.3.2 FINAL PAYMENT

Whenever the improvements provided for by the Contract shall have been completely performed on the part of the CONTRACTOR, as evidenced in the certificate of acceptance, and all required submissions provided to the OWNER, a final estimate showing the value of the work shall be prepared

by the Architect as soon as the necessary measurements and computations can be made. All prior estimates upon which payments have been made are subject or necessary corrections or revisions in the final payment. The amount of this final estimate, less any sums that have been previously paid, or deducted under the provisions of the Contract, shall be paid the CONTRACTOR within 30 days after the final acceptance, provided that the CONTRACTOR has furnished to the OWNER a consent of surety and an affidavit or other satisfactory evidence that all indebtedness connected with the Work and all sums of money due for any labor, materials, apparatus, fixtures or machinery furnished for and used in the performance of the work have been paid or otherwise satisfied, or that the person or persons to whom the same may respectively be due have consented to such final payment.

The acceptance by the CONTRACTOR of the final payment as aforesaid shall operate as and shall be a release to the OWNER from all claims or liabilities under the Contract, including all subcontractor claims, for anything done or furnished or relating to the Work under the Contract or for any act or neglect of said OWNER relating to or connected with the Contract.

All warranties and guarantees shall commence from the date of the certificate of acceptance. No interest shall be due the CONTRACTOR on any partial or final payment or on the retainage.

### **5.3 MODIFICATIONS TO CONTRACT WORK OR TIME OF PERFORMANCE**

#### **5.3.1 OWNER'S RIGHT TO TEMPORARILY SUSPEND WORK**

#### **5.3.2 REASONS FOR SUSPENSION**

The OWNER shall have the right by written order to temporarily suspend the work, in whole or in part, whenever, in the judgment of the OWNER, such temporary suspension is required:

- A. in the interest of the OWNER generally,
- B. due to government or judicial controls or orders which make performance of this contract temporarily impossible or illegal,
- C. to coordinate the work of separate contractors at the job site,
- D. to expedite the completion of a separate contract even though the completion of this particular Contract may be thereby delayed,
- E. because of weather conditions unsuitable for performance of the Work, or
- F. because the CONTRACTOR is proceeding contrary to contract provisions or has failed to correct conditions considered unsafe for workmen.

The written order of the OWNER to the CONTRACTOR shall state the reasons for suspending the work and the anticipated periods for such

suspension. Upon receipt of the OWNER'S written order, the CONTRACTOR shall suspend the work covered by the order and shall take such means and precautions as may be necessary to properly protect the finished and partially finished work, the unused materials and uninstalled equipment, including the providing of suitable drainage about the work and erection of temporary structures where necessary. The CONTRACTOR shall not suspend the Work without written direction from the OWNER and shall proceed with the work promptly when notified by the OWNER to resume operations.

### 5.3.3 NO ADDITIONAL COMPENSATION

No additional compensation shall be paid to the CONTRACTOR for a temporary suspension of the Work by the OWNER or otherwise where same is caused by the fault of the CONTRACTOR. Where such temporary suspension is not due to the fault of the CONTRACTOR, he shall be entitled to:

A. an equitable extension of working time for the completion of the work, not to exceed the delay caused by such temporary suspension, as determined by the OWNER; and

B. the actual and necessary costs of properly protecting the finished and partially finished work, unused materials and uninstalled equipment during the period of the ordered suspension as determined by the OWNER as being beyond the Contract requirements, such costs, if any, to be determined pursuant to the terms of the Contract; and

C. where the CONTRACTOR elects to move equipment from the job site and then return it to the site when the work is ordered resumed, the actual and necessary costs of these moves, in an amount determined by the OWNER pursuant to the terms of the Contract.

### 5.3.4 USE OF COMPLETED PORTIONS OF WORK

The OWNER may, after written notice to the CONTRACTOR, and without incurring any liability for increased compensation to the CONTRACTOR, take over and use any completed portion of the Work prior to the final completion and acceptance of the entire work included in the Contract, and notwithstanding that the time allowed for final completion has not expired. The OWNER and CONTRACTOR agree that occupancy of portions of the Work by the OWNER shall not in any way evidence the substantial completion of the entire work or signify the OWNER's acceptance of the Work.

The CONTRACTOR shall not object to, nor interfere in any way with, such occupancy or use after receipt of the OWNER'S written notice. Immediately prior to such occupancy and use, the OWNER shall inspect such portion of the Work to be taken over and shall furnish the CONTRACTOR a written statement of the work, if any, still to be done on such part. The CONTRACTOR shall promptly thereafter complete such unfinished work to permit occupancy and use on the date specified in the OWNER'S written order, unless the OWNER shall permit specific items of work to be finished after the occupancy and use by the OWNER.

In the event the CONTRACTOR is unreasonably delayed by the OWNER exercising its rights under this section, the CONTRACTOR may submit a request for an extension of time; CONTRACTOR'S sole remedy for an unreasonable delay shall be an extension of time and shall not be entitled to any additional compensation.

#### 5.4 COMMENCEMENT; TIME OF COMPLETION; DELAYS; EXTENSION OF TIME; LIQUIDATED DAMAGES

##### 5.4.1 COMMENCEMENT; TIME OF COMPLETION

Contractor shall commence work within ten (10) consecutive calendar days after receiving from County a notice to proceed. Contractor agrees and covenants that the number of consecutive calendar days allowed to complete all work following a notice to proceed shall be as follows:

\_\_\_\_\_

##### 5.4.2. LIQUIDATED DAMAGES FOR FAILURE TO COMPLETE ON TIME

Time is of the essence in the progress and completion of this Contract. For each calendar day that any Work shall remain uncompleted after the time specified in the proposal and the Contract, or the increased time granted by the OWNER, or as equitably increased by additional work or materials ordered after the Contract is signed, the sum per day given in the following schedule, unless otherwise specified in the special provisions, shall be deducted from the monies due the CONTRACTOR:

\_\_\_\_\_ (\$ \_\_\_\_\_)

The sum of money thus deducted for such delay, failure or noncompletion is not to be considered as a penalty, but shall be deemed, taken and treated as reasonable liquidated damages, per calendar day that the CONTRACTOR shall be in default after the time stipulated in the Contract for completing the Work. The said amounts are fixed and agreed upon by

and between OWNER and CONTRACTOR because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER in such event would sustain; and said amounts are agreed to be the amount of damages which the OWNER would sustain and which shall be retained from the monies due, or that may become due, the CONTRACTOR under this Contract; and if said monies be insufficient to cover the amount owing, then the CONTRACTOR or his surety shall pay any additional amounts due.

#### 5.4.3 EXTENTIONS OF TIME

The CONTRACTOR shall be entitled to an extension of working time under this Contract only when claim for such extension is submitted to the OWNER in writing by the CONTRACTOR within seven days from and after the time when any alleged cause of delay shall occur, and then only when such time is approved by the OWNER. In adjusting the Contract working time for the completion of the Project, unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including, acts of God or the public enemy, acts of the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or delays of subcontractors due to such causes beyond their control shall be taken into consideration.

If the satisfactory execution and completion of the Contract should require work and materials in greater amounts or quantities than those set forth in the Contract, requiring more time for completion than the anticipated time, then the contract working time shall be equitably increased, but not more than in the same proportion as the cost of the additional work bears to the cost of the original work contracted for. No allowances shall be made for delays or suspension of the performance of the Work due to the fault of the CONTRACTOR.

No adjustment to working time shall be made if, concurrently with the equitable cause for delay, there existed a cause for delay due to the fault or negligence of the CONTRACTOR, his agents, employees or subcontractors; and no adjustment shall be made to the Contract Price and the CONTRACTOR shall not be entitled to claim or receive any additional compensation as a result of or arising out of any delay resulting in adjustment to the working time hereunder, including delays caused by the acts or negligence of the OWNER. Notwithstanding any other provision of the Contract Documents, all claims for extension of working time must be submitted in accordance with the provisions of this Contract, and no act of the OWNER shall be deemed a waiver or entitlement of such extension.

### 5.5 TERMINATION FOR CONVENIENCE OF THE OWNER

#### 5.5.1 NOTICE OF TERMINATION

The performance of the Work under this Contract may be terminated by the OWNER in whole or from time to time in part, in accordance with this section, whenever the OWNER shall determine that such termination is in the best interest of the OWNER. Any such termination shall be effected by mailing a notice of termination to the CONTRACTOR specifying the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective. Receipt of the notice shall be deemed conclusively presumed and established when the letter is placed in the United States Mail by the OWNER. Further, it shall be deemed conclusively presumed and established that such termination is made with just cause as therein stated; and no proof in any claim, demand or suit shall be required of the OWNER regarding such discretionary action.

#### 5.5.2 CONTRACTOR ACTION

After receipt of a notice of termination, and except as otherwise directed by the OWNER or Architect, the CONTRACTOR shall:

- A. stop work under the Contract on the date and to the extent specified in the notice of termination;
- B. place no further orders or subcontracts for materials, services or facilities except as may be necessary for completion of such portion the Work under the Contract as is not terminated;
- C. terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;
- D. transfer title to the OWNER and deliver in the manner, at the times, and to the extent, if any, directed by the OWNER or Architect:
  - 1. the fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the notice of termination; and
  - 2. the completed or partially completed plans, drawings, information and other property which, if the Contract had been completed, would have been required to be furnished to the OWNER.
- E. complete performance of such part of the work as shall not have been terminated by the notice of termination; and
- F. take such action as may be necessary, or as the Architect may direct, for the protection and preservation of the property related to its Contract which is in the possession of the CONTRACTOR and in which the OWNER has or may acquire an interest.

At a time not later than 30 days after the termination date specified in the notice of termination, the CONTRACTOR may submit to the OWNER a list, certified as to the quantity and quality, of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Architect. Not later than 15



days thereafter, the OWNER shall accept title to such items and remove them or enter into a storage agreement covering the same, provided that the list submitted shall be subject to verification by the Architect upon removal of the items, or, if the items are stored, within 45 days from the date of submission of the list, and provided that any necessary adjustments to correct the list as submitted shall be made prior to final settlement.

#### 5.5.3 TERMINATION CLAIM

Within 60 days after notice of termination, the CONTRACTOR shall submit his termination claim to the Architect and the OWNER in the form and with the certification prescribed herein. Unless one or more extensions in writing are granted by the OWNER upon request of the CONTRACTOR, made in writing within such 60-day period or authorized extension thereof, any and all such claims shall be conclusively deemed waived. The termination claim shall (1) list all Contract Work which the CONTRACTOR has completed but for which the CONTRACTOR asserts it has not been paid, including any retainage; (2) list of all fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in connection with the performance of the Contract and the itemized cost for each such fabricated or unfabricated part, work in process, completed work, supplies and other material; (3) list all costs and expenses saved as a result of the termination of the Contract. The termination claim must include a copy of all invoices for fabricated or unfabricated parts, supplies and other material produced as a part of, or acquired in connection with the performance of the Contract for which the CONTRACTOR seeks compensation; all invoices for any subcontractors providing services related to the Contract; and (3) evidence of payment of all material suppliers and subcontractors, together with CONTRACTOR's certification that all such-material suppliers and subcontractors have been fully paid together with executed lien releases from each such material supplier and subcontractor. The termination claim may not include any request for payment of Extra Work for which a Change Order has not been issued or for which the CONTRACTOR has not fully and timely complied with the provisions of section 2.3 of this Contract.

#### 5.5.4 AMOUNTS

The CONTRACTOR and OWNER may agree upon the whole or any part of the amount or amounts to be paid to the CONTRACTOR by reason of the total or partial termination of work pursuant hereto, provided that such agreed amount or amounts shall never exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the Contract Price of work not terminated. The contract shall be amended accordingly, and the CONTRACTOR shall be paid the agreed amount. No amount shall be due for lost or anticipated profits. Nothing prescribing the amount to be paid to the CONTRACTOR in the event of failure of the CONTRACTOR and the OWNER to agree upon the whole amount to be

paid to the CONTRACTOR by reason of the termination of work pursuant to this section, shall be deemed to limit, restrict or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the CONTRACTOR pursuant to this paragraph.

#### 5.5.5 FAILURE TO AGREE

In the event of the failure of the CONTRACTOR and the OWNER to agree, as provided herein, upon the whole amount to be paid to the CONTRACTOR by reason of the termination of work pursuant to this section, the OWNER shall determine, on the basis of information available to it, the amount, if any, due to the CONTRACTOR by reason of the termination and shall pay to the CONTRACTOR the amounts determined. No amount shall be due for lost or anticipated profits.

#### 5.5.6 DEDUCTIONS

In arriving at the amount due the CONTRACTOR under this section, there shall be deducted (a) all unliquidated advance or other payments on account theretofore made to the CONTRACTOR, applicable to the terminated portion of this contract; (b) any claim which the OWNER may have against the CONTRACTOR in connection with this Contract; and (c) the agreed price for or the proceeds of sale of any materials, supplies or other things kept by the CONTRACTOR or sold, pursuant to the provisions of this clause, and not otherwise recovered by or credited to the OWNER.

#### 5.5.7 ADJUSTMENT

If the termination hereunder be partial prior to the settlement of the terminated portion of this Contract, the CONTRACTOR may file with the Owner a request in writing for an equitable adjustment of the price or prices specified in the Contract relating to the continued portion of the Contract (the portion not terminated by the notice of termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices; nothing contained herein, however, shall limit the right of the OWNER and the CONTRACTOR to agree upon the amount or amounts to be paid to the CONTRACTOR for the completion of the continued portion of the Contract when said contract does not contain an established contract price for such continued portion.

#### 5.5.8 NO LIMITATION OF RIGHTS

Nothing contained in this section shall limit or alter the rights which the OWNER may have for termination of this Contract under any other provision of this Contract or any other right which OWNER may have for default or breach of contract by CONTRACTOR.

## 5.6 CONTRACTOR DEFAULT: OWNER'S RIGHT TO SUSPEND WORK AND ANNUL CONTRACT

The Work or any portion of the Work under contract shall be suspended immediately on written order of the OWNER declaring the CONTRACTOR to be in default. A copy of such notice shall be served on the CONTRACTOR'S surety. The contract may be annulled by the OWNER for any good cause or causes, among others of which special reference is made to the following:

- A. failure of the CONTRACTOR to start the work within 10 days from date specified in the written work order issued by the OWNER to begin the work;
- B. evidence that the progress of the work being made by the CONTRACTOR is insufficient to complete the work within the specified working time;
- C. failure of the CONTRACTOR to provide sufficient and proper equipment, materials or construction forces for properly executing the Work;
- D. evidence that the CONTRACTOR has abandoned the Work or discontinuance of the performance of the Work or any part thereof and failure to resume performance within a reasonable time after notice to do so;
- E. evidence that the CONTRACTOR has become insolvent or bankrupt, or otherwise financially unable to carry on the Work;
- F. deliberate failure on the part of the CONTRACTOR to observe any requirements of the specifications or to comply with any orders given by the Architect as provided for in the specifications;
- G. failure of the CONTRACTOR to promptly make good any defects in materials or workmanship, or any defects of any nature, the correction of which has been directed in writing by the OWNER;
- H. evidence of collusion for the purpose of illegally procuring a contract or perpetrating fraud on the OWNER in the construction of work under contract;
- I. repeated violations of safe working procedures;
- J. the filing by the CONTRACTOR of litigation against the OWNER prior to final completion of the Work. When the Work is suspended for any of the causes itemized above, or for any other cause or causes, the CONTRACTOR shall discontinue the Work or such part thereof as the OWNER shall designate, whereupon the surety may either at its option assume the Contract or that portion thereof which the OWNER has ordered the CONTRACTOR to discontinue and perform the same or, with the written consent of the OWNER, sublet the same, provided, however, that the surety shall exercise its option within two weeks after the written notice to discontinue the work has been served upon the CONTRACTOR and upon the surety or its authorized agents. The surety in such event shall assume the CONTRACTOR'S place in all respects and shall be paid by the OWNER for all work performed by it in accordance with the terms of the Contract, but in no event shall such payments exceed the contract amount, regardless of the cost to the surety to complete the Work.

In the event that the surety assumes the CONTRACTOR'S place, duties and responsibilities in the Contract, all monies remaining due the CONTRACTOR at the time of his default shall thereupon become due and payable to the surety as the work progresses, subject to all terms of the Contract. In case the surety does not, within the hereinabove specified time, exercise its obligation to assume the Contract or that portion thereof which the OWNER has ordered the CONTRACTOR to discontinue, then the OWNER shall have the power to complete by contract or otherwise, as it may determine, the Work herein described or such part thereof as it may deem necessary; and the CONTRACTOR hereto agrees that the OWNER shall have the right to take possession of or use any or all of the materials, plans, tools, equipment, supplies and property of every kind provided by the CONTRACTOR for the purpose of the Work and to procure other tools, equipment and materials for the completion of the same and to charge to the account of the CONTRACTOR the expense of said contract for labor, materials, tools, equipment and expenses incident thereto. The expense so charged shall be deducted by the OWNER out of such monies as may be due or may at any time thereafter become due the CONTRACTOR under and by virtue of the Contract or any part thereof.

The OWNER shall not be required to obtain the lowest bid for the work of completing the Contract, but the expenses to be deducted shall be the actual cost of such work. In case such expense is less than the sum which would have been payable under the contract if the same had been completed by the CONTRACTOR, then in such case the OWNER may pay the CONTRACTOR the difference in the cost, provided that the CONTRACTOR shall not be entitled to any claim for damages or for loss of anticipated profits.

In case such expense shall exceed the amount which would have been payable under the Contract if the same had been completed by the CONTRACTOR, the CONTRACTOR and his surety shall pay the amount of the excess to the OWNER on notice from the OWNER for excess due including any costs incurred by the OWNER, such as inspection, legal fees and liquidated damages. When any particular part of the Work is being carried out by the OWNER by contract or otherwise under the provisions of this section, the CONTRACTOR shall continue the remainder of the Work in conformity with the terms of the contract and in such manner as not to hinder or interfere with the performance of workmen employed as above provided by the OWNER or surety.

#### 5.7 SUSPENSION BY COURT ORDER AGAINST THE OWNER

The CONTRACTOR shall suspend such part or parts of the Work pursuant to a court order issued against the OWNER and shall not be entitled to additional compensation by virtue of such court order; neither shall the CONTRACTOR be liable to the OWNER in the event the Work is suspended by such court order, unless such suspension is due to the fault or negligence of the CONTRACTOR. A delay of the CONTRACTOR due to a court order against the OWNER, or due to the OWNER'S failure to secure right-of-way at the time required or because of a conflict of a utility with the Work, shall not be cause for additional compensation

for damages sustained by the CONTRACTOR, but may be a cause for extension of contract working time only. The CONTRACTOR'S sole remedy for any suspensions of the Work is an equitable extension of time to perform the Work.

#### 5.8 NO WAIVER OF RIGHTS OR ESTOPPEL

The OWNER, or any officer or agent thereof, shall not be precluded at any time, either before or after final completion and acceptance of the Work and final payment therefore from:

A. showing the true and correct amount, classifications, quality and character of the Work done and materials furnished by the CONTRACTOR or any other person under this Contract, or from showing at any time that any determination, return, decision, approval, order, letter, payment or certification is untrue and incorrect or improperly made in any particular, or that the Work or the materials or any parts thereof do not in fact conform to the contract requirements; and (b) demanding the recovery from the CONTRACTOR of any overpayments made to him, or such damages as the OWNER may sustain by reason of the CONTRACTOR'S failure to perform each and every part of this Contract in strict accordance with its terms; or both.

### **VI. AUTHORITY OF THE ARCHITECT**

6.1 All work shall be performed in a good and workmanlike manner and to the satisfaction of the Architect. The Architect shall decide all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress of the work, sequence of the construction, interpretation of the plans and specifications, acceptable fulfillment of the Contract, compensation, mutual rights between contractors under these specifications and suspension of the Work. He shall determine the amount and quality of work performed and materials furnished, and his decisions and estimates shall be final. His estimate in such event shall be a condition precedent to the right of the CONTRACTOR to receive money due him under the Contract.

#### 6.2 OWNER'S REPRESENTATIVES

Where the Contract Documents indicate that determinations, directions or approvals shall be made by the OWNER or "Owner's representatives," this shall mean the OWNER acting directly, or through duly authorized persons acting within the limit of authority delegated to them. Any determination, direction or approval of such authorized representatives shall be subject to review by the OWNER. For purposes of administering the schedule or the payment provisions of this Contract the Architect may act as the Owner's representative for purposes of approving payments, changes, scheduling, or acceptance of the Work, at the OWNER'S discretion.

#### 6.3 INSPECTIONS OF WORK PROGRESS

The Architect shall visit the site at during construction of the Project as necessary as the Owner's Representative to verify that the Work is being performed in compliance with the Contract Documents and shall be given total access to the Project by the CONTRACTOR. Site visits or inspections by the Architect shall in no way relieve the CONTRACTOR of any of its responsibilities or duties pursuant to the Contract Documents. The Architect will neither have control over, nor be responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work or the Project. The CONTRACTOR shall be solely responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work or the Project.

#### 6.4 CONSTRUCTION STAKES

Architect will provide the Contractor with primary horizontal and vertical control to consist of one construction baseline and two benchmarks.

The Contractor shall take all necessary precautions to preserve any and/or all markings and staking. Payment for costs of restaking shall be the responsibility of the Contractor.

#### 6.5 APPROVAL OF SUBMITTALS

The Architect shall review and approve or take other appropriate action the CONTRACTOR's submittals such as Shop Drawings, Product Data and Samples, for the purpose of checking for conformance with the Contract Documents. The Architects review of the submittals shall not relieve the CONTRACTOR of any of its obligations to perform the Work in strict compliance with the Contract Documents. The Architect's review shall not be considered approval of safety precautions, means and methods, techniques, sequences or procedures that are the responsibility of the CONTRACTOR.

### **VII. CLAIMS OR DISPUTES**

#### 7.1 CLAIMS AGAINST OWNER AND ACTION THEREON.

No claim against the OWNER under the Contract or for breach of the Contract or additional compensation for extra or disputed work shall be made or asserted against the OWNER under the Contract or in any court action, unless the CONTRACTOR shall have strictly complied with all requirements relating to the giving of notice and information with respect to such claim as required by the Contract.

#### 7.2 CLAIM AGAINST OFFICERS, EMPLOYEES OR AGENT OF THE OWNER.

No claim whatsoever shall be made by the CONTRACTOR against any, past, present or future, officer, employee or agent of the OWNER for or on account of, anything done or omitted to be done in connection with this Contract.

## VIII. MISCELLANEOUS PROVISIONS

### 8.1 FINANCIAL INTEREST IN ANY CONTRACT BY OWNER'S OFFICERS, EMPLOYEES OR AGENTS

No officer, employee or agent of the OWNER shall have a financial interest, direct or indirect, in any contract with the OWNER or be financially interested, directly or indirectly, in the sale to the OWNER of any land, materials, supplies or services, except on behalf of the OWNER as an officer or employee. Any willful violation of this article shall constitute malfeasance in office, and any officer or employee guilty thereof shall thereby forfeit his office or position. Any violation of this article with the knowledge, expressed or implied, of the persons, partnership, company, firm, association or corporation contracting with the OWNER shall render the contract involved voidable by the OWNER.

### 8.2 SERVICE OF NOTICES

The OWNER and the CONTRACTOR shall each designate addresses where all notices, directions or other communication may be delivered or to which they may be mailed.

Notices to the surety or sureties on contract bonds shall be directed or delivered to the home office, or to the agent or agents who executed the bonds on behalf of the surety or sureties, or to their designated agent for delivery of notices.

Actual delivery of any such notice, direction or communication to the aforesaid places or depositing it in a postpaid wrapper addressed thereto in any post office regularly maintained by the United States Postal Service shall be conclusively deemed to be sufficient service thereof upon the above persons as of the date of such delivery or deposit.

The designated addresses may be changed at any time by an instrument in writing executed by the party changing the addresses and delivered to the other party.

Nothing herein contained shall, however, be deemed to preclude or tender inoperative the service of any notice, direction or communication upon the above parties personally or, if the CONTRACTOR be a corporation, upon any officer or director thereof.

### 8.3 UNLAWFUL PROVISIONS DEEMED STRICKEN

In the event a term, condition, or provision of this Agreement is determined to be void, unenforceable, or unlawful by a court of competent jurisdiction, then that term, condition, or provision shall be deleted and the remainder of the Agreement shall remain in full force and effect.

### 8.4 ALL LEGAL PROVISIONS INCLUDED

It is the intent and agreement of the parties to this contract that all legal provisions of law required to be inserted herein shall be and are inserted herein. If through mistake or oversight, however, any such provision is not herein inserted, or is not inserted in proper form, then upon application of either party, the contract shall be amended so as to strictly comply with the law and without prejudice to the rights of either party hereunder.

#### 8.5 ASSIGNMENTS

The CONTRACTOR shall not assign, transfer, convey or otherwise dispose of this contract, or his right to execute it, or his right, title or interest in it or any part thereof without the previous written consent of the surety company and the written approval of the OWNER.

The CONTRACTOR shall not assign, either legally or equitably, by power of attorney or otherwise, any of the monies due or to become due under this Contract or its claim thereto without the prior written consent of the surety company and the written approval of the OWNER.

The approval of the OWNER of a particular assignment, transfer or conveyance shall not dispense with such approval to any further or other assignments.

The approval by the OWNER of any assignment, transfer or conveyance shall not operate to release the CONTRACTOR or surety hereunder from any of the Contract and bond obligations, and the CONTRACTOR shall be and remain fully responsible and liable for the defaults, negligent acts and omissions of his assignees, their agents and employees, as if they were his own.

#### 8.6 STATE AND LOCAL SALES AND USE TAXES

The OWNER qualifies for exemption from the state and local sales and use taxes, pursuant to the provisions of Section 151.309 of the Texas Limited Sales, Excise and Use Tax Act. Therefore, the CONTRACTOR shall not pay such taxes which would otherwise be payable in connection with the performance of this Contract.

The CONTRACTOR shall issue an exemption certificate in lieu of the tax on the purchase, rental or lease of:

- A. all materials, supplies, equipment and other tangible personal property incorporated into the real property being improved; and
- B. all materials, supplies, equipment and other tangible personal property used or consumed by the CONTRACTOR in performing the Contract with the OWNER. Materials and supplies "used in the performance of a contract" include only those materials actually incorporated into the property being improved and those supplies directly used to incorporate such materials into the property being improved. Overhead supplies and supplies used indirectly or only incidental to the performance of the Contract with the OWNER are not included in the exemption.



Under “reasons said purchaser is claiming this exemption” in the exemption certificate, the CONTRACTOR must name the OWNER and the project for which the equipment, material and supplies are being purchased, leased or rented.

#### 8.7 VENUE AND GOVERNING LAW

The parties agree that the laws of the State of Texas shall govern the interpretation, validity, performance and enforcement of this Construction Agreement, and that the exclusive venue for any legal proceeding involving this Construction Agreement shall be in Collin County, Texas.

#### 8.8 NO WAIVER OF LEGAL RIGHTS

Inspection by the Architect or OWNER; any order, measurement, quantity or certificate by the Architect; any order by the OWNER for payment of money; any payment for or acceptance of any work; or any extension of time or any possession taken by the OWNER shall not operate as a waiver of any provisions of the contract or any power therein reserved to the OWNER of any rights or damages therein provided. Any waiver of any breach of contract shall not be held to be a waiver of any other or subsequent breach. The OWNER reserves the right to correct any error that may be discovered in any estimate that may have been paid and to adjust the same to meet the requirements of the Contract Documents. The OWNER reserves the right to recover by process of law sums as may be sufficient to correct any error or make good any deficiency in the Work resulting from such error, dishonesty or collusion by the CONTRACTOR or his agents, discovered in the Work after the final payment has been made.

Neither final acceptance of the Work, nor final payment shall relieve the CONTRACTOR of responsibility for faulty materials or workmanship, and the CONTRACTOR shall promptly remedy any defects due thereto and pay for any damage to other work resulting therefrom. Likewise, neither final acceptance nor final payment, nor partial or entire use or occupancy of the work by the OWNER shall constitute acceptance of work not done in accordance with the Contract Documents or relieve CONTRACTOR of liability with respect to any expressed or implied warranties or responsibility for faulty materials or workmanship, whether same be patently or latently defective.

#### 8.9 OBLIGATION TO PERFORM FUNCTIONS

Any failure or neglect on the part of OWNER or Architect or inspectors to enforce provisions herein dealing with supervision, control, inspection, testing or acceptance and approval of the work shall never operate to relieve CONTRACTOR from full compliance with the Contract Documents nor render OWNER liable to CONTRACTOR for money damages, extensions of time or increased compensation of any kind.

#### 8.10 SUCCESSORS AND ASSIGNS

Subject to the limitations upon assignment and transfer herein contained, this contract shall be binding upon and inure to the benefit of the parties hereto, their respective successors and assigns.

8.11 HEADINGS

The title and headings contained in the Contract Documents and the subject organization are used only to facilitate reference, and in no way define or limit the scope of intent of any of the provisions of this Contract.

8.12 ENTIRE AGREEMENT; AMENDMENTS; BINDING EFFECT

This Construction Agreement, including the Contract Documents and all the documents incorporated therein represents the entire and integrated agreement between the OWNER, Collin County, and the CONTRACTOR, and supersedes all prior negotiations, representations, or agreements, either written or oral. This Construction Agreement may be amended only by written instrument signed by both, the OWNER, Collin County, and the CONTRACTOR. CONTRACTOR acknowledges that no representations have been made to it, upon which it is relying in entering into this Contract, which are not expressly set forth in the Contract Documents.

8.13 INTERPRETATION

Although this Agreement is drafted by the OWNER, Collin County, should any part be in dispute, the parties agree that this Construction Agreement shall not be construed more favorable for either party. No rule of construction requiring that ambiguities in this Contract shall be construed more favorably for either party shall apply.

8.14 EXPENSES FOR ENFORCEMENT

In the event either Party hereto is required to employ an attorney to enforce the provisions of this Agreement or is required to commence legal proceedings to enforce the provisions hereof, the prevailing Party shall be entitled to recover from the other, reasonable attorney's fees and court costs incurred in connection with such enforcement, including collection.

8.15 FORCE MAJEURE

No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, when and to the extent such failure or delay is caused by or results from acts beyond the affected party's reasonable control, including, without limitation: acts of God; flood, fire or explosion; war, invasion, riot or other civil unrest; actions, embargoes or blockades in effect on or after the date of this Agreement; or national or regional emergency (each of the foregoing, a "Force Majeure Event"). A party whose performance is affected by a Force Majeure Event shall give notice to the other party, stating the period of time the occurrence is expected to continue and shall use diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.

IN WITNESS WHEREOF, the parties have executed this Construction Agreement upon the year and date indicated beneath their signatures hereto.

**CONTRACTOR:**

\_\_\_\_\_

By: \_\_\_\_\_

Date: \_\_\_\_\_

**ATTEST:**

\_\_\_\_\_  
Secretary

**COLLIN COUNTY, TEXAS:**

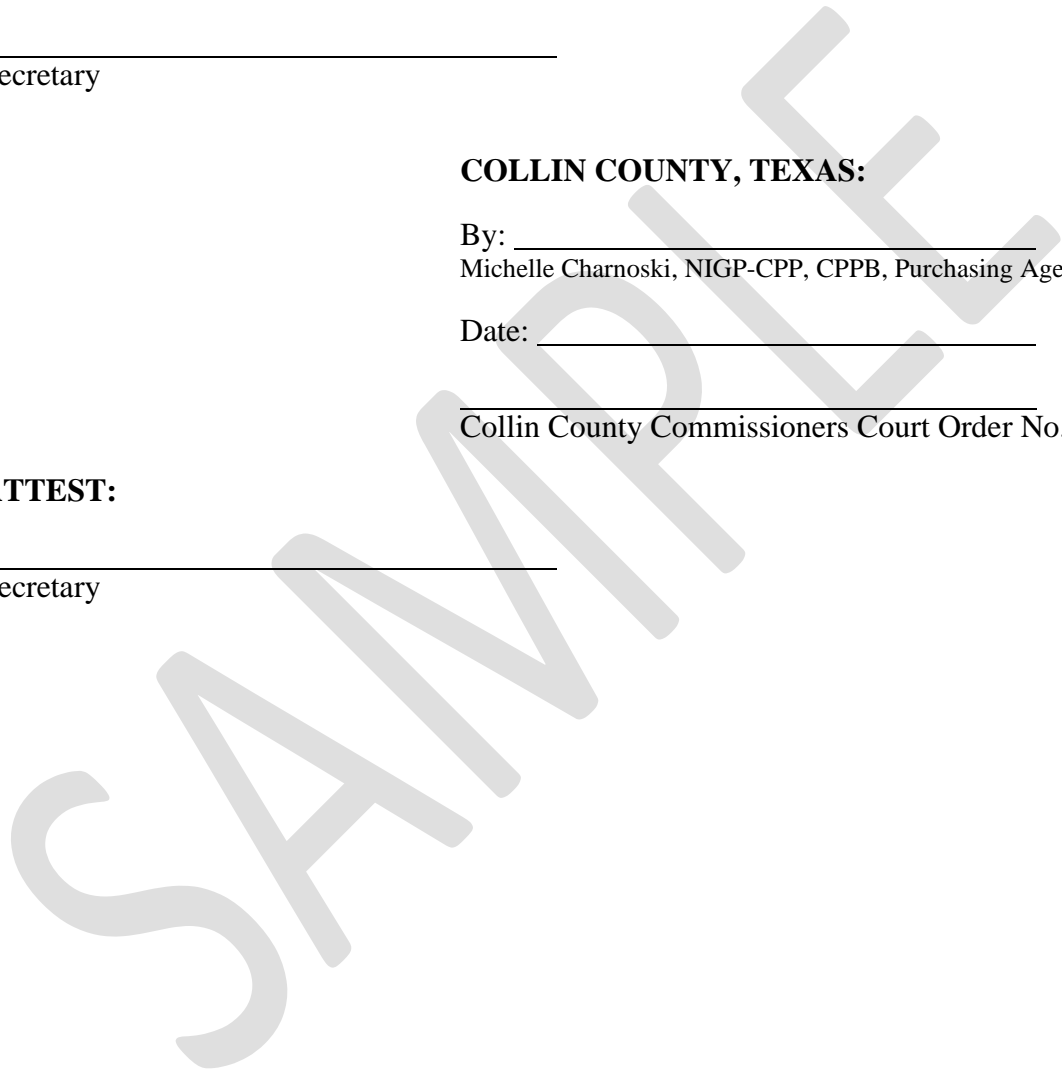
By: \_\_\_\_\_  
Michelle Charnoski, NIGP-CPP, CPPB, Purchasing Agent

Date: \_\_\_\_\_

\_\_\_\_\_  
Collin County Commissioners Court Order No.

**ATTEST:**

\_\_\_\_\_  
Secretary



**ACKNOWLEDGMENTS**

**STATE OF TEXAS** §

**COUNTY OF \_\_\_\_\_** §

**BEFORE ME,** \_\_\_\_\_ on this day personally appeared \_\_\_\_\_  
\_\_\_\_\_, of \_\_\_\_\_, a \_\_\_\_\_ corporation,  
known to me (or proved to me on the oath of) \_\_\_\_\_ or  
through \_\_\_\_\_ (description of identity card or other document) to be the  
person whose name is subscribed to the foregoing instrument and acknowledged to me that  
he/she executed the same as the act and deed of the corporation, for the purposes and  
consideration therein expressed and in the capacity therein stated.

**GIVEN UNDER MY HAND AND SEAL OF OFFICE,** this the \_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
Notary Public, State of Texas

\_\_\_\_\_  
Printed Name

My Commission expires on the \_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

**STATE OF TEXAS** §

**COUNTY OF COLLIN§**

**BEFORE ME,** \_\_\_\_\_ on this day personally appeared \_\_\_\_\_  
\_\_\_\_\_, Purchasing Agent of COLLIN COUNTY, TEXAS, a political subdivision  
of the State of Texas, known to me (or proved to me on the oath of) \_\_\_\_\_  
\_\_\_\_\_ or through \_\_\_\_\_ (description of identity card or other document) to be  
the person whose name is subscribed to the foregoing instrument and acknowledged to me  
that he/she executed the same as the act and deed of COLLIN COUNTY, TEXAS, for the  
purposes and consideration therein expressed and in the capacity therein stated.

**GIVEN** under my hand and seal of office this the \_\_\_\_\_ day of \_\_\_\_\_  
\_\_\_\_\_, 20\_\_

\_\_\_\_\_  
Notary Public, State of Texas

\_\_\_\_\_  
Printed Name

My Commission expires on the \_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

**Request for Taxpayer  
Identification Number and Certification**

**Give Form to the  
requester. Do not  
send to the IRS.**

▶ Go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9) for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.		
	2 Business name/disregarded entity name, if different from above		
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only <b>one</b> of the following seven boxes.		4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):  Exempt payee code (if any) _____  Exemption from FATCA reporting code (if any) _____  <i>(Applies to accounts maintained outside the U.S.)</i>
	<input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate		
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ <b>Note:</b> Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is <b>not</b> disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.		
	<input type="checkbox"/> Other (see instructions) ▶ _____		
	5 Address (number, street, and apt. or suite no.) See instructions.		Requester's name and address (optional)
6 City, state, and ZIP code			
7 List account number(s) here (optional)			

**Part I Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

**Note:** If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

<b>Social security number</b>											
				-			-				
<b>or</b>											
<b>Employer identification number</b>											
				-							

**Part II Certification**

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

<b>Sign Here</b>	Signature of U.S. person ▶	Date ▶
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**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9).

**Purpose of Form**

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

*If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.*

**006111 PERFORMANCE BOND**

STATE OF TEXAS §  
COUNTY OF COLLIN §

**KNOW ALL MEN BY THESE PRESENTS:**

That \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and fully authorized to transact business in the State of Texas, whose address is \_\_\_\_\_ of the City of \_\_\_\_\_ County of \_\_\_\_\_, and State of \_\_\_\_\_, (hereinafter referred to as "Principal"), and \_\_\_\_\_ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of \_\_\_\_\_ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto \_\_\_\_\_ (hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) (not less than 100% of the approximate total amount of the Contract as evidenced in the proposal plus 10-percent of the stated penal sum as an additional sum of money representing additional court expenses, attorneys' fees, and liquidated damages arising out of or connected with the below identified Contract) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

**WHEREAS**, the Principal has entered into a certain written contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_\_, to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of \_\_\_\_\_.

**CONDITION OF THIS OBLIGATION IS SUCH**, that if the said Principal fully and faithfully executes the work and performance of the Contract in accordance with the plans specifications, and Contract Documents, including any extensions thereof which may be granted with or without notice to Surety, during the original term thereof, and during the life of any guaranty required under the Contract, and according to the true intent and meaning of said Contract and the plans and specifications hereto annexed, if the Principal shall repair and/or replace all defects due to faulty materials or workmanship that appear within a period of one year from the date of final completion and final acceptance of the work by OWNER; and if the Principal shall fully indemnify and save harmless the OWNER from all costs and damages which OWNER may suffer by reason of failure to so perform herein and shall fully reimburse and repay OWNER all outlay and expense which the OWNER may incur in making good any default or deficiency, then this obligation shall be void; otherwise, to remain in full force and effect; and in case said CONTRACTOR shall fail to do so, it is agreed that the OWNER may do said work and supply such materials and charge the same against said CONTRACTOR and Surety on this obligation. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

**"PROVIDED, HOWEVER**, that this bond is executed pursuant to the provisions Texas Government Code, Chapter 2253, as amended, and Chapter 3503 of the Texas Insurance Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said articles to the same extent as if they were fully copied at length herein.

Surety, for value received, stipulates and agrees that the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety, but in no event shall a Change Order or Supplemental Agreement which reduces the Contract price decrease the penal sum of the Bond. And further that no change, extension of time, alteration, or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder.

Surety agrees that the bond provides for the repairs and/or replacement of all defects due to faulty materials and workmanship that appear within a period of one (1) year from the date of completion and acceptance of the improvement by the OWNER.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_.

**WITNESS**

\_\_\_\_\_

**PRINCIPAL**

\_\_\_\_\_  
Printed/Typed Name \_\_\_\_\_  
Title: \_\_\_\_\_  
Company: \_\_\_\_\_  
\_\_\_\_\_  
Address: \_\_\_\_\_

**WITNESS**

\_\_\_\_\_

**SURETY**

\_\_\_\_\_  
Printed/Typed Name \_\_\_\_\_  
Title: \_\_\_\_\_  
Company: \_\_\_\_\_  
\_\_\_\_\_  
Address: \_\_\_\_\_

The Resident Agent of the Surety for delivery of notice and service of process is:  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**Note:** Date of Bond must NOT be prior to date of contract.

**006113 PAYMENT BOND**

STATE OF TEXAS            §  
COUNTY OF COLLIN       §

**KNOW ALL MEN BY THESE PRESENTS:**

That \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and fully authorized to transact business in the State of Texas, whose address is \_\_\_\_\_ of the City of \_\_\_\_\_ County of \_\_\_\_\_, and State of \_\_\_\_\_, (hereinafter referred to as "Principal"), and \_\_\_\_\_ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of \_\_\_\_\_ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto \_\_\_\_\_ (hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) (not less than 100% of the approximate total amount of the Contract as evidenced in the proposal) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

**WHEREAS**, the Principal has entered into a certain written contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_\_, to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of \_\_\_\_\_.

**NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH**, that the bond guarantees the full and proper protection of all claimants supplying labor and material in the prosecution of the work provided for in said Contract and for the use of each claimant, and that conversely should the Principal faithfully perform said Contract and in all respects duly and faithfully observe and perform all and singular the covenants, conditions, and agreements in and by said Contract, agreed to by the Principal, and according to the true intent and meaning of said Contract and the claims and specifications hereto annexed, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modification to Surety being hereby waived, then this obligation shall be void; otherwise, to remain in full force and effect. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

**"PROVIDED, HOWEVER**, that this bond is executed pursuant to the provisions Texas Government Code, Chapter 2253, as amended, and Chapter 3503 of the Texas Insurance Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said articles to the same extent as if they were fully copied at length herein.

Surety, for value received, stipulates and agrees that the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety and that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in anyway affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_.

**WITNESS**

\_\_\_\_\_

**PRINCIPAL**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

**WITNESS**

\_\_\_\_\_

**SURETY**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

The Resident Agent of the Surety for delivery of notice and service of process is:  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**Note:**     Date of Bond must NOT be prior to date of contract.

**006119 MAINTENANCE BOND**

STATE OF TEXAS            §  
COUNTY OF COLLIN       §

**KNOW ALL MEN BY THESE PRESENTS:**

That \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and fully authorized to transact business in the State of Texas, whose address is \_\_\_\_\_ of the City of \_\_\_\_\_ County of \_\_\_\_\_, and State of \_\_\_\_\_, (hereinafter referred to as "Principal"), and \_\_\_\_\_ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of \_\_\_\_\_ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto \_\_\_\_\_ (hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, , in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

**WHEREAS**, the Principal has entered into a certain written contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_\_, to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of \_\_\_\_\_.

**NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH**, that the bond guarantees the full and proper maintenance and repair of the work herein contracted to be done and performed for a period of \_\_\_\_\_ year(s) from the date of acceptance and Principal will do all necessary backfilling that may arise on account of sunken conditions in ditches, or otherwise, and do and perform all necessary work and repair any defective condition growing out of or arising from the improper laying or construction of same, or on account of any breaking of same caused by said CONTRACTOR in construction of same , or on account of any defect arising in any of said work laid or constructed by said CONTRACTOR or on account of improper excavation or backfilling, it being understood that the purpose of this section is to cover all defective conditions arising by reason of defective materials, work or labor performed by said CONTRACTOR, then this obligation shall be void; otherwise, to remain in full force and effect; and in case said CONTRACTOR shall fail to do so, it is agree that the OWNER may do said work and supply such materials and charge the same against said CONTRACTOR and Surety on this obligation. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

**"PROVIDED, HOWEVER**, that said Surety, for value received, stipulates and agrees the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety and that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans specifications, or drawings accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_.

**WITNESS**

\_\_\_\_\_

**PRINCIPAL**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

**WITNESS**

\_\_\_\_\_

**SURETY**

\_\_\_\_\_

Printed/Typed Name \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

The Resident Agent of the Surety for delivery of notice and service of process is:  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**Note:**     Date of Bond must NOT be prior to date of contract.



**01 11 00**  
**SUMMARY OF WORK**

1.0 GENERAL

1.01 SUMMARY

- A. The Project is located in the Park Plaza Development at 920 E. Park Boulevard, Plano, Texas, east of US Highway 75 and west of Avenue K (State Highway 5). The building is located behind the 900 E. Park Boulevard building with no frontage on Park Boulevard.
- B. The Work is composed of demolition of existing office finishout and new general construction, including HVAC, electrical, plumbing and fire sprinkler systems.
- C. The Work of this Contract will be performed under a single prime contract.
- D. Contractor's duties:
  - 1. Provide all labor, materials, equipment, tools, machinery, facilities, and services necessary for proper execution and completion of the work.
  - 2. Give required notices.
  - 3. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.
  - 4. Promptly submit written notice to Architect of observed variance of Contract Documents from legal requirements. It is Contractor's responsibility to make certain that construction complies with applicable codes and regulations.
  - 5. Verify all conditions at the site and dimensions in the field prior to starting work. Architect shall be notified in writing of any discrepancies found.
  - 6. The Drawings and Specifications represent the work to be completed, not the method of construction.
  - 7. Obtain and pay for any inspections, permits, or licenses required. The required fees cost shall be included in the bid.
  - 8. Use every precaution to prevent damage to roads, adjacent property, buildings, and utilities above and below ground that are adjacent to or included in the area under contract. Repair and replace, at Contractor's expense, any material or item damaged or destroyed because of Contractor's operations.

1.02 WORK UNDER OTHER CONTRACTS

- A. The Owner has awarded/will award a separate contract for additional work to be performed at the site following Substantial Completion. Completion of that work depends on successful completion of preparatory work under this Contract. The Contract for future work includes the following:
  - 1. Open office modular furniture and casegood furniture.
- B. Cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Do not unreasonably encumber site with materials or equipment.

1.03 CONTRACTOR USE OF PREMISES

- A. Confine operations at site to areas permitted by law, ordinances, permits and as designated by Owner.
  - 1. Contractor and his personnel shall park their vehicles and trailers only in areas designated on the Drawings.
- B. Owner will continue to occupy the existing facility during construction of the addition and remodel to specific areas of the existing facility. Contractor shall carry out his work in such a way as to minimize interference with the Owner's work and use of site and parking areas specifically.
- C. Do not unreasonably encumber site with materials or equipment.
- D. Maintain required fire exits and fire lanes during construction in accordance with Fire Department regulations. Provide signage, barricades, walkways, and fences as may be required.

#### 1.04 PARTIAL OWNER OCCUPANCY

- A. The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
1. The Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner occupancy.
  2. Contractor shall obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
  3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions of the building.
  4. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions of the building.

#### 1.05 OWNER-FURNISHED PRODUCTS

- A. The Owner will furnish the open office furnishings - modular furnishings. The Work includes providing support systems to receive the Owners equipment, and mechanical and electrical connections.
1. The Owner will arrange for and deliver necessary Shop Drawings, Product Data, and Samples to the Contractor.
  2. The Owner will arrange for and pay for delivery of Owner-furnished items according to the Contractor's Construction Schedule.
  3. Following delivery, the Owner will inspect items delivered for damage.
  4. If Owner-furnished items area damaged, defective, or missing, the Owner will arrange for replacement.
  5. The Owner will arrange for manufacturer's field services and for the delivery of manufacturer's warranties to the appropriate Contractor.
  6. The Contractor shall designate delivery dates of Owner-furnished items in the Contractor's Construction Schedule.
  7. The Contractor shall review Shop Drawings, Product Data, and Samples and return them to the Architect noting discrepancies or problems anticipated in use of the product.
  8. The Contractor is responsible for receiving, unloading, and handling Owner-furnished items at the site.
  9. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.

#### 1.06 CORRELATION OF DOCUMENTS

- A. Anything mentioned in the Specifications and not shown on the Drawings or shown on the Drawings and not mentioned in the Specifications, is of like effect as if shown or mentioned in both. In case of difference between Drawings and Specifications, the Specifications will govern.
- B. Figures given on Drawings govern scale measurements, and large scale drawings and details govern small scale drawings. Schedules on any contract drawing will take precedence over conflicting information on that or any other contract drawing.
- C. Specifications determine nature and setting, workmanship and quality of materials; Drawings establish design, quantities, dimensions and details; Schedules give locations.
- D. Similar conditions may be illustrated by a single detailed drawing. The drawing may be subject to minor adjustments as directed by the Architect to satisfy exact and specific conditions. If discrepancies appear, Contractor shall request interpretation from the Architect prior to proceeding with the Work. Contractor shall not make such interpretations by himself, except at his own risk, responsibility and expense.

1.07 EXISTING CONDITIONS

- A. The Architect assumes no responsibility for the accuracy of the information on existing drawings. It is the intent of the Contract Drawings to integrate new work with existing work and the Contractor shall verify actual conditions.
- B. Prior to commencement of work, visit and examine the site verifying all existing conditions, control points, principal lines and elevations, presence of underground utilities, at or related to the site and existing buildings. In the event of any inconsistency or conflict between existing conditions and the bidding documents, immediately notify the Architect. Do not undertake any phase of the work affected by such inconsistency or conflict, pending the issuance of instructions by the Architect.
- C. Locations of utilities shown on the Drawings have been obtained from the existing site utility plans and utility companies. Contractor shall examine the site and verify to his own satisfaction the location and elevation of all utilities and shall adequately inform himself as to their relationship to the Work.
- D. Specifications and Drawings in no way imply as to the condition of the soil encountered. When excavation is required in execution of the Work, Contractor agrees that he has informed himself regarding conditions affecting the Work, labor, and materials required, without recourse to any representations as to soil conditions that may appear or seem to be implied in any portion of the Contract Documents.

2.0 PRODUCTS

Not Applicable to this Section.

3.0 EXECUTION

Not Applicable to this Section.

END OF SUMMARY OF WORK

**01 26 00**  
**CONTRACT MODIFICATION PROCEDURES**

1.0 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- 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 1 of these Specifications.
  - 2. General Conditions: Changes in the Work.
  - 3. Section 01 29 00: Payment Procedures.
  - 4. Section 01 33 00: Submittal Procedures.
  - 5. Section 01 62 00: Product Options.

1.02 MINOR CHANGES IN THE WORK

- A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.

1.03 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-initiated proposal requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
  - 2. Unless otherwise indicated in the proposal request, within fifteen (15) days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.
    - a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-initiated proposal requests: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
  - 1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
  - 2. Include a list of quantities of products required and unit cost, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Comply with requirements of Section 01 62 00 Products Options if the proposed change requires substitution of one product or system for a product or system specified.

1.04 ALLOWANCES

- A. Allowance adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
1. Include installation costs in the purchase amount only where indicated as part of the allowance.
  2. When requested, prepare explanations and documentation to substantiate the margins claimed.
  3. Submit substantiation of a change in scope of work claimed in the Change Orders related to unit-cost allowances.
  4. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

1.05 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction change directive: When the Owner and the Contractor disagree on the terms of a Change Order Proposal Request, the Architect may issue a Change Order Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.06 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.
1. Change Orders will be numbered in sequence and dated.
  2. Change Orders will describe the change or changes and will refer to the Proposal Requests or Supplemental Instructions involved.
  3. The Architect will issue four (4) copies of each Change Order to the Contractor.
    - a. The Contractor promptly shall sign all four (4) copies and return three (3) copies to the Architect.
    - b. The Architect will retain one (1) signed copy in his file and will forward two (2) signed copies to the Owner.

2.0 PRODUCTS

Not Applicable to this Section.

3.0 EXECUTION

Not Applicable to this Section.

END OF CONTRACT MODIFICATION PROCEDURES

**01 29 00**  
**PAYMENT PROCEDURES**

1.0 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Schedule of Values and Applications for Payment.
- 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 1 of these Specifications.
  - 2. Form of Agreement: Contract Sum, schedule for payments.
  - 3. Section 01 33 00: Submittal Procedures: Construction Schedule.
  - 4. Section 01 77 00: Closeout Procedures: Payments upon Substantial Completion and Completion of the Work.

1.02 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of Schedule of Values with preparation of the Contractor's Construction Schedule.
- B. Approval: Submit and obtain the Architect's approval of the Schedule of Values at the earliest feasible date, but in no case later than ten (10) days before the date scheduled for submittal of the initial Application for Payment.
- C. Format and content: Use the Table of Contents in this Project Manual as a guide to establish the format for the Schedule of Values.
  - 1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of the Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal
  - 2. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Table of Contents in this Project Manual. Break principal subcontract amounts down into several line items (i.e. Concrete shall be broken down into walks, paving, piers, grade beams, slabs, etc. as a minimum).
  - 3. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
  - 4. Provide separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
  - 5. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
  - 6. Temporary facilities and other major cost items that are not direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values.
  - 7. Schedule updating: List Change Orders as a separate line item when Change Orders or Construction Change Directives result in a change in the Contract Sum.
  - 8. Overhead and profit: Show separate line item values for overhead and profit. Percent draw each month to coincide with percent of job completion.

#### 1.04 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
  - 1. The initial Application for Payment, the Application for Payment at the time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment application forms: Use AIA Form G702 Application and Certificate for Payment and AIA Form G703 Continuation Sheet.
- C. Application preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.
  - 1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions are made.
  - 2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- D. Transmittal: Submit four (4) signed and notarized original copies of each Application for Payment to the Architect. At least one copy shall be complete, including waivers of lien and similar attachments, when required.
- E. Waivers of mechanics lien: With each Application for Payment, submit waivers of mechanics lien from every entity who is lawfully entitled to file a mechanics lien arising out of the Contract or a Contractor's Certificate of Release of Liens for the construction period covered by the previous application.
- F. Payment application period: The period of construction Work covered by each Application for Payment is the period from the previous Application to the 20th day of the current month. Applications shall not include dates projected beyond the date of the Application.
- G. Payment application times:
  - 1. Informal submittal: Make an informal submittal of the Application for Payment to the Architect at the last regularly scheduled project meeting of each month.
    - a. Revise the informal submittal of the Application for Payment as agreed at the Project meeting, initialing all copies.
  - 2. Formal submittal: Make a formal submittal of the Application for Payment by the 25th day of the month based on the revised informal submittal.
    - a. By the end of the month, the Architect will compare the formal submittal with the approved informal submittal and, when approved, will sign the Application and Certificate for Payment and will distribute:
      - 1) One (1) copy to Contractor.
      - 2) One (1) copy to Architect's file.
      - 3) Two (2) copies to Owner.
- H. Payment to Contractor: Upon approval, Owner will disburse progress payments directly to the Contractor within thirty (30) days of receipt of the Application for Payment.
  - 1. Basis for payment shall be ninety five percent (95%) of the total labor and materials less the aggregate total of all previous payments. The aggregate total of all progress payments shall not exceed ninety five percent (95%) of the Contract Sum.
- I. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
  - 1. List of subcontractors.
  - 2. List of principal suppliers and fabricators.
  - 3. Schedule of Values.
  - 4. Contractor's Construction Schedule (preliminary if not final).
  - 5. List of Contractor's staff assignments.
  - 6. List of Contractor's principal consultants.
  - 7. Copies of building permit.
  - 8. Copies of authorizations and licenses from governing authorities for performance of the Work.
  - 9. Initial progress report.
  - 10. Report of preconstruction meeting.

- J. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
  2. Administrative actions and submittals that shall precede or coincide with the application include:
    - a. Occupancy permits and similar approvals.
    - b. Warranties (guarantees) and maintenance agreements.
    - c. Test/adjust/balance records.
    - d. Change of door locks to Owner's access.
    - e. Maintenance instructions.
    - f. Meter readings.
    - g. Startup performance reports.
    - h. Changeover information related to Owner's occupancy, use, operation, and maintenance.
    - i. Final cleaning.
    - j. Application for reduction of retainage and consent of surety.
    - k. Advice on shifting insurance coverages.
    - l. List of incomplete Work recognized as exceptions to Architect's Certificate of Substantial Completion.
- K. Final Application for Payment: Administrative actions and submittals that shall precede or coincide with submittal of the final Application for Payment include:
1. Completion of Project closeout requirements.
  2. Completion of items specified for completion after Substantial Completion.
  3. Assurance that unsettled claims will be settled.
  4. Assurance that Work not complete and accepted will be completed without undue delay.
  5. Transmittal of required Project construction records to the Owner.
  6. Proof that taxes, fees and similar obligations have been paid.
  7. Removal of temporary facilities and services.
  8. Removal of surplus materials, rubbish, and similar elements.
- Upon approval, Owner will disburse final payment directly to the Contractor within thirty (30) days of receipt of the Final Application for Payment.

2.0 PRODUCTS  
Not Applicable to this Section.

3.0 EXECUTION  
Not Applicable to this Section.

#### END OF PAYMENT PROCEDURES



**01 31 00**  
**PROJECT MANAGEMENT & COORDINATION**

1.0 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
  - 1. Coordination.
  - 2. Administrative and supervisory personnel.
  - 3. General installation provisions.
  - 4. Cleaning and protection.
- B. Related work:
  - 1. Section 01 31 19: Project Meetings.
  - 2. Section 01 33 00: Submittal Procedures: Construction Schedule.
  - 3. Section 01 71 23: Field Engineering.
  - 4. Section 01 77 00: Closeout Procedures.

1.02 COORDINATION

- A. Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of these Specifications that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
  - 3. Make provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
  - 1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to:
  - 1. Preparation of schedules.
  - 2. Installation and removal of temporary facilities.
  - 3. Delivery and processing of submittals.
  - 4. Progress meetings.
  - 5. Project closeout activities.
- D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.03 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. Project supervision: Maintain an experienced and capable superintendent on the project full time when work is being accomplished.
- B. Staff Names: Within fifteen (15) days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
  - 1. Post copies of the list in the Project meeting room and the temporary field office where applicable.

## 2.0 PRODUCTS

Not Applicable to this Section.

## 3.0 EXECUTION

### 3.01 GENERAL COORDINATION PROVISIONS

- A. Inspection of conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until satisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

### 3.02 CLEANING AND PROTECTION

- A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to:
  - 1. Excessive static or dynamic loading.
  - 2. Excessive internal or external pressures.
  - 3. Excessively high or low temperatures.
  - 4. Excessively high or low humidity.
  - 5. Thermal shock.
  - 6. Air contamination or pollution.
  - 7. Water or ice.
  - 8. Solvents.
  - 9. Chemicals.
  - 10. Light.
  - 11. Radiation.
  - 12. Puncture.
  - 13. Abrasion.
  - 14. Heavy traffic.
  - 15. Soiling, staining or corrosion.
  - 16. Bacteria.
  - 17. Rodent and insect infestation.
  - 18. Combustion.
  - 19. Electrical current.

20. High speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF PROJECT MANAGEMENT & COORDINATION

**01 31 19**  
**PROJECT MEETINGS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to:
  - 1. Preconstruction conferences.
  - 2. Progress meetings.
  - 3. Coordination meetings.
- B. Related work:
  - 1. Section 01 29 00: Payment Procedures.
  - 2. Section 01 31 00: Project Management & Coordination.
  - 2. Section 01 33 00: Submittal Procedures.

1.02 PRECONSTRUCTION CONFERENCE

- A. Schedule a preconstruction conference before starting construction, at a time convenient to the Owner and the Architect, but no later than fifteen (15) days after execution of the Agreement. Hold the conference at the Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: Authorized representatives of the Owner and the Architect; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including the following:
  - 1. Tentative construction schedule.
  - 2. Critical work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.
  - 7. Submittal of Shop Drawings, Product Data and Samples.
  - 8. Preparation of Record Documents.
  - 9. Use of premises.
  - 10. Parking availability
  - 11. Office, work and storage areas.
  - 12. Equipment deliveries and priorities.
  - 13. Safety procedures.
  - 14. First aid.
  - 15. Security
  - 16. Housekeeping
  - 17. Schedule for progress meetings
  - 18. Working hours.

1.03 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project site at regular intervals; approximately every two (2) weeks. Notify the Owner and the Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities may be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. At the last regularly scheduled progress meeting of each month, review preliminary submittal of payment request in accordance with Section 01 29 00 of these Specifications.
2. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
3. Review the present and future needs of each entity present, including the following:
  - a. Interface requirements.
  - b. Time.
  - c. Sequences.
  - d. Status of submittals.
  - e. Deliveries.
  - f. Off-site fabrication problems.
  - g. Access.
  - h. Site utilization.
  - i. Temporary facilities and services.
  - j. Hours of work.
  - k. Hazards and risks.
  - l. Housekeeping.
  - m. Quality and work standards.
  - n. Change Orders.
  - o. Documentation of information for payment requests.
- D. Reporting: No later than three (3) days after each meeting, distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
  1. Schedule updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

#### 1.04 COORDINATION MEETINGS

- A. Conduct project coordination meetings at regular intervals convenient to all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special preinstallation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

#### 2.0 PRODUCTS

Not Applicable to this Section.

#### 3.0 EXECUTION

Not Applicable to this Section.

END OF PROJECT MEETINGS

**01 33 00**  
**SUBMITTAL PROCEDURES**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
  - 1. Contractor's Construction Schedule.
  - 2. Shop Drawings.
  - 3. Product Data.
  - 4. Samples.
  - 5. Quality assurance submittals.
- B. Related work:
  - 1. Section 01 29 00: Payment Procedures: Schedule of Values.
  - 2. Section 01 31 19: Project Meetings: Meeting minutes.
  - 3. Section 01 45 00: Quality Control: Inspection and test reports.
  - 4. Section 01 78 00: Closeout Submittals: Closeout documents.

1.02 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
  - 3. Verify all dimensions and that each item and its submittal conform in all respects with the specified requirements. Affix the Contractor's signature to each submittal certifying that this coordination has been performed.
  - 4. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
    - a. Allow two (2) weeks for initial review. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
    - b. If an intermediate submittal is necessary, process the same as the initial submittal.
    - c. Allow two (2) weeks for processing each resubmittal.
    - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- B. Submittal preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
  - 1. Provide a space approximately 4 x 5 IN on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
  - 2. Include the following information on the label for processing and recording action taken.
    - a. Project name.
    - b. Date.
    - c. Name and address of the Architect.
    - d. Name and address of the Contractor.
    - e. Name and address of the subcontractor.

- f. Name and address of the supplier.
  - g. Name of the manufacturer.
  - h. Number and title of appropriate Specification Section.
  - i. Drawing number and detail references, as appropriate.
- C. Submittal transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. The Architect will not accept submittals received from sources other than the Contractor.
- 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Contractor's responsibility for deviations from Contract Document requirements is not relieved by Architect's review unless specific deviations are brought to the attention of the Architect in writing. Include Contractor's certification that information complies with Contract Document requirements.
  - 2. When material is resubmitted for any reason, transmit under a new letter of transmittal and identify as a resubmittal.

### 1.03 CONSTRUCTION SCHEDULE

- A. Bar-chart schedule: Prepare a fully developed, horizontal bar-chart type, contractor's construction schedule. Submit within thirty (30) days after the date established for "Commencement of the Work".
- 1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the Schedule of Values.
  - 2. Within each time bar, indicate estimated completion percentage in 10 percent (10%) increments. As Work progresses, place a contrasting mark in each bar to indicate actual completion.
  - 3. Prepare the schedule on a sheet, or a series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
  - 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
  - 5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, progress reports, payment requests, and other schedules.
  - 6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
- B. Phasing: On the schedule, where applicable, show how requirements for phased completion of the Work by separate Contractors and partial occupancy by the Owner affect the sequence of the Work.
- C. Work stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.
- D. Cost correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of payment requests.
- E. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
- 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- F. Schedule updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule and submit with each month's Application for Payment.

#### 1.04 SHOP DRAWINGS

- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
  - 1. Dimensions.
  - 2. Identification of products and materials included by sheet number and detail number.
  - 3. Compliance with specified standards.
  - 4. Notation of coordination requirements.
  - 5. Notation of dimensions established by field measurement.
  - 6. Sheet size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 x 11 IN but no larger than 36 x 48 IN.
  - 7. Submittal: Submit one (1) correctable, translucent, reproducible print and three (3) blue-line or black-line prints for the Architect's review.
    - a. The Architect will return the reproducible print.
    - b. The blue-line or black-line prints will be retained by the Architect for his use and distribution to his consultants and the Owner.
    - c. The Contractor may make and distribute such copies as are required for his purposes.
    - d. The Contractor shall provide and maintain one (1) copy as a Record Document.
    - e. The Contractor shall provide necessary final copies to be included in maintenance manuals.
  - 8. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

#### 1.05 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves. Where Product Data must be specially prepared because printed data is not suitable for use, submit as Shop Drawings.
  - 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
    - a. Manufacturer's printed recommendations.
    - b. Compliance with trade association standards.
    - c. Compliance with recognized testing agency standards.
    - d. Application of testing agency labels and seals.
    - e. Notation of dimensions verified by field measurements.
    - f. Notation of coordination requirements.
  - 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
  - 3. Submit the number of copies which are required for the Contractor's use, including maintenance manuals and Record Documents, PLUS three (3) copies. The Architect will retain three (3) copies for his use and distribution to his consultants and the Owner and will return the other copies marked with action taken and corrections or modifications required.
  - 4. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal form.
    - a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
    - b. Do not permit use of unmarked copies of Product Data in connection with construction.



## 1.06 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
  - 1. Mount or display Samples in the manner specified to facilitate review of qualities indicated. Prepare samples to match the Architect's Sample. Include the following:
    - a. Specification Section number and reference.
    - b. Generic description of the Sample.
    - c. Sample source.
    - d. Product name or name of the manufacturer.
    - e. Compliance with recognized standards.
    - f. Availability and delivery time.
  - 2. Submit Samples for review of size, kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
    - a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.
    - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
    - c. Refer to other Specification Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
  - 3. Preliminary submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.
    - a. The Architect will review and return preliminary submittals with the Architect's notation, indicating selection and other action.
  - 4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three (3) sets. The Architect will return one (1) set marked with the action taken.
  - 5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
    - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
    - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets of Samples to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
  - 1. Field Samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.
    - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

## 1.07 QUALITY ASSURANCE SUBMITTALS

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of these Specifications.
- B. Certifications: Where other Sections of these Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
  - 1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

- C. Inspection and test reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Section 01 45 00 Quality Control.

1.08 ARCHITECT'S ACTION

- A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.
- B. Action stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
  - 1. Final unrestricted release: When the Architect marks a submittal "No Exceptions Taken", the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
  - 2. Final but restricted release: When the Architect marks a submittal "Make Corrections Noted", the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
  - 3. Returned for resubmittal: When the Architect marks a submittal "Revise and Resubmit", do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in according to the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project site or elsewhere where Work is in progress.
  - 4. Other action: Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal marked "No Exceptions Taken".
- C. Unsolicited submittals: The Architect will return unsolicited submittals to the sender without action.

2.0 PRODUCTS

Not Applicable to this Section.

3.0 EXECUTION

Not Applicable to this Section.

END OF SUBMITTAL PROCEDURES

**01 42 00**  
**REFERENCES**

1.0 GENERAL

1.01 DEFINITIONS

- A. All definitions set forth in the General Conditions of the Contract for Construction or in other Contract Documents are applicable to the Bidding Documents.
- B. "Bidding Documents" include the Invitation to Bid, Instructions to Bidders, the Bid Form, other sample bidding and contract forms and the proposed Contract Documents including any Addenda issued prior to receipt of bids.
- C. "Addenda" are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.
- D. A "Bid" is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.
- E. "Base Bid" is the sum stated in the Bid for which the Bidder offers to perform the Work described as the base, to which Work may be added or deducted for sums stated in Alternate Bids.
- F. An "Alternative Bid" is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.
- G. A "Unit Price" is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.
- H. A "Bidder" is one who submits a Bid for a prime contract with the Owner for the Work described in the proposed Contract Documents.
- I. A "Sub-bidder" is one who submits a bid to a Bidder for materials or labor for a portion of the Work.
- J. "Indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown", "noted", "scheduled", and "specified" are used to help the reader locate the reference. Location is not limited.
- K. "Directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.
- L. "Approved" when used conjunction with the Architect's action on the Contractor's submittals, applications and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- M. "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- N. "Furnish" means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- O. "Install" describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- P. "Provide" means to furnish and install a product, complete and ready for the intended use.
- Q. "Product" includes materials, systems, and equipment.
- R. "Similar" means in its general sense and not necessarily identical.
- S. "Building code" and "code" refers to regulations of governmental agencies having jurisdiction.
- T. An "Installer" is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
  - 1. The term "experienced", when used with the term "installer", means having a minimum of five (5) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.

2. Trades: Using terms such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
  - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
- U. “Project site” is the space available to the Contractor for performing construction activities, either 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 the description of the land on which the Project is to be built.
- V. “Testing agencies” are independent entities engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

#### 1.02 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 2004 MASTERFORMAT format and numbering system.
- B. Specification content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
  1. Abbreviated language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
  2. Streamlined language: The Specifications generally use the imperative mod and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
    - a. The words “shall be” are implied where a colon (:) is used within a sentence or phrase.

#### 1.03 INDUSTRY STANDARDS

- A. Applicability of standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication dates: Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of the date of the Contract Documents.
- C. Conflicting requirements: Where compliance with two (2) or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the Architect before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

1. Minimum quantity or quality levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- D. Copies of standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.
- E. Abbreviations and names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Co.'s "Encyclopedia of Associations", available at most libraries.
- F. Abbreviations and names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents, are defined to mean the associated names.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADA	American's with Disabilities Act
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers Association
AFPA	American Forest and Paper Association
AGA	American Gas Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALI	Associated Laboratories Inc.
ALSC	American Lumber Standards Committee
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
AOAC	Association of Official Analytical Chemists
AOSA	Association of Official Seed Analysts
APA	American Plywood Association
APA	American Parquet Association
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	Acoustical Society of America
ASC	Adhesive and Sealant Council

ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPA	American Sod Producers Association
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
ATIS	Alliance for Telecommunications Industry Solutions
AWCMA	American Window Covering Manufacturers Association
AWI	American Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders' Hardware Manufacturers Association
BIA	Brick Institute of America
BIFMA	Business and Institutional Furniture Manufacturers Association
BOCA	Building Officials and Code Administration
CAGI	Compressed Air and Gas Institute
CAUS	Color Association of the United States
CBM	Certified Ballast Manufacturers Association
CCC	Carpet Cushion Council
CDA	Copper Development Association Inc.
CFFA	Chemical Fabrics & Film Association Inc.
CGA	Compressed Gas Association
CISCA	Ceiling and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tile Institute of America
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DLPA	Decorative Laminate Products Association
ECSA	Exchange Carriers Standards Association
EIA	Electronic Industries Association
EIMA	Exterior Insulation Manufacturers Association
EJMA	Expansion Joint Manufacturers Association
ETL	ETL Testing Laboratories Inc.
FCI	Fluid Controls Institute
FCIB	Floor Covering Installation Board
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Engineering and Research Organization
FTI	Facing Tile Institute
GA	Gypsum Association
HEI	Heat Exchange Institute
HI	Hydronics Institute
HI	Hydraulic Institute
HMA	Hardwood Manufacturers Association
HPMA	Hardwood Plywood Manufacturers Association
HPVA	Hardwood Plywood and Veneer Association
IBD	Institute of Business Designers
IBC	International Building Code
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IESNA	Illuminating Engineering Society of North America
IGCC	Insulating Glass Certification Council
ILI	Indiana Limestone Institute of America

IMSA	International Municipal Signal Association
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
KCMA	Kitchen Cabinet Manufacturers Association
LIA	Lead Industries Association Inc.
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MCAA	Mechanical Contractors Association of America
MFMA	Maple Flooring Manufacturers Association
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society
NAA	National Arborist Association
NAAMM	National Association of Architectural Metal Manufacturers
MAIMA	North American Insulation Manufacturers Association
NAPA	National Asphalt Pavement Association
NAPF	National Association of Plastic Fabricators (Now DLPA)
NBGQA	National Building Granite Quarries Association
NBS	National Bureau of Standards
NBHA	National Builders Hardware Association (Now DHI)
NCMA	National Concrete Masonry Association
NCRPM	National Council on Radiation Protection and Measurement
NEC	National Electrical Code (From NFPA)
NECA	National Electrical Contractors Association
NEII	National Elevator Industry Inc.
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFRC	National Fenestration Rating Council
NHLA	National Hardwood Lumber Association
NKCA	National Kitchen Cabinet Association
NLGA	National Lumber Grades Authority
NOFMA	National Oak Flooring Manufacturers Association
NPA	National Particleboard Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NSSEA	National School Supply and Equipment Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association (Now NWWDA)
NWWDA	National Wood Window and Door Association (Formerly NWMA)
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RMA	Rubber Manufacturers Association
SAMA	Scientific Apparatus Makers Association
SBCCI	Southern Building Code Congress International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SGCC	Safety Glazing Certification Council
SHLMA	Southern Hardwood Lumber Manufacturers Association
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SPRI	Single Ply Roofing Institute

SSPC	Steel Structures Painting Council
SSPMA	Sump and Sewage Pump Manufacturers
SWI	Steel Window Institute
SWPA	Submersible Wastewater Pump Association
TAS	Texas Accessibility Standards
TCA	Tile Council of America
TIMA	Thermal Insulation Manufacturers Association
TPI	Truss Plate Institute
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL	Underwriters Laboratories
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Wallcovering Manufacturers Association
WIC	Woodwork Institute of California
WLPDIA	Western Lath Plaster Drywall Industries Association
WRI	Wire Reinforcement Institute
WSC	Water Systems Council
WSFI	Wood and Synthetic Flooring Institute
WWPA	Western Wood Products Association
WWPA	Woven Wire Products Association

G. Federal government agencies: Names and titles of federal government standard- or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or Specification-producing agencies of the federal government.

CE	Corps of Engineers (U.S. Dept. of the Army)
CFR	Code of Federal Regulations
CPSC	Consumer Product Safety Commission
CS	Commercial Standard (U.S. Dept. of Commerce)
DOC	Department of Commerce
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration (U.S. DOT)
FCC	Federal Communications Commission
FDA	Food and Drug Administration
FHA	Federal Housing Administration (U.S. Dept. of HUD)
FS	Federal Specification (From GSA)
GSA	General Services Administration
MIL	Military Standardization Documents (U.S. Dept. of Defense)
NIST	National Institute of Standards and Technology (U.S. Dept. of Agriculture)
OSHA	Occupational Safety and Health Administration (U.S. Dept. of Labor)
PS	Public Standard (U.S. Dept. of Commerce)
REA	Rural Electrification Administration (U.S. Dept. of Agriculture)
USDA	U.S. Department of Agriculture
USPS	U.S. Postal Service

2.0 PRODUCTS  
Not Applicable to this Section.

3.0 EXECUTION  
Not Applicable to this Section.

END OF REFERENCES



**01 50 00**  
**TEMPORARY FACILITIES & CONTROLS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
  - 3. Telephone service.
  - 4. Storm and sanitary sewer.
- C. Support facilities include, but are not limited to, the following:
  - 1. Temporary heat.
  - 2. Field offices and storage sheds.
  - 3. Temporary roads and paving.
  - 4. Sanitary facilities, including drinking water.
  - 5. Dewatering facilities and drains.
  - 6. Temporary enclosures.
  - 7. Hoists and temporary elevator use.
  - 8. Temporary project identification signs and bulletin boards.
  - 9. Waste disposal services.
  - 10. Rodent and pest control.
  - 11. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
  - 1. Temporary fire protection.
  - 2. Barricades, warning signs, and lights.
  - 3. Sidewalk bridge or enclosure fence for the site.
  - 4. Environmental protection.

1.02 SUBMITTALS

- A. Temporary utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and termination schedule: Within fifteen (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.03 REFERENCES

- A. ANSI A10 Series: Construction and Demolition Standards.
- B. NECA 200: Recommended Practice for Installing and Maintaining Temporary Electrical Power at Construction Sites.
- C. NFPA 10: Standard for Portable Fire Extinguishers.
- D. NFPA 70: National Electric Code.
- E. NFPA 241: Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction including, but not limited to, the following:
  - 1. Building Code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police and Fire Department rules.
  - 5. Environmental protection regulations.

- B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”, ANSI A10 Series standards for “Safety Requirements for Construction and Demolition”, and NECA Electrical Design Library “Temporary Electrical Facilities”.
  - 1. Electrical service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service NFPA 70 “National Electrical Code”.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## 1.05 PROJECT CONDITIONS

- A. Temporary utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site.

## 2.0 PRODUCTS

### 2.01 MATERIALS

- A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
  - 1. Use only cleaning materials which are compatible with the surface being cleaned, as recommended by the manufacturer of the material, and as needed to maintain the specified standard of cleanliness.
- B. Lumber and plywood: Comply with requirements Section 06 10 00 Rough Carpentry.
  - 1. For job-built temporary offices, shops, and sheds within the construction area, provide UL labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
  - 2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
  - 3. For fences and vision barriers, provide minimum 3/8 IN thick exterior plywood.
  - 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8 IN thick exterior plywood.
- C. Gypsum wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- D. Roofing materials: Provide UL Class A standard-weight asphalt shingles or LTL Class C mineral-surfaced roll; roofing on roofs of job-built temporary offices, shops, and sheds.
- E. Paint: Comply with requirements of Section 09 90 00 Painting.
  - 1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
  - 2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
  - 3. For interior walls of temporary offices, provide two (2) coats interior latex-flat wall paint.
- F. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- G. Water: Provide potable water approved by local health authorities.
- H. Open-mesh fencing: Provide 0.120 IN thick, galvanized 2 IN chain link fabric fencing 6 FT high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 IN I.D. for line posts and 2-1/2 IN I.D. for corner posts.

## 2.02 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
  - 1. Use only cleaning equipment which is compatible with the surface being cleaned, as recommended by the manufacturer of the material, and as needed to maintain the specified standard of cleanliness.
- B. Water hoses: Provide 3/4 IN, heavy-duty, abrasion-resistant, flexible rubber hoses 100 FT long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shut off nozzles at hose discharge.
- C. Electrical outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120 Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical power cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and light fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating units: Provide temporary heating units that have been tested and labeled by LTL, FK or another recognized trade association related to the type of fuel being consumed.
- G. Temporary offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary toilet units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- I. Fire extinguishers: Provide hand-carried, portable, UL rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## 3.0 EXECUTION

### 3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.

4. Use charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.
- B. Water service:
    1. Contractor may use existing water facilities at the site.
  - C. Electric power service:
    1. Contractor may use existing electrical service at the site.
    2. Provide all necessary temporary wiring, extensions, and temporary lighting devices.
  - D. Temporary lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.
    1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
  - E. Temporary heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
  - F. Heating facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.
    1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
  - G. Temporary telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first-aid station.
    1. Separate telephone lines: Provide additional telephone lines for the following:
      - a. Where an office has more than two (2) occupants, install a telephone for each additional occupant or pair of occupants.
      - b. Provide a dedicated telephone line for a fax machine in the field office.
    2. At each telephone, post a list of important telephone numbers.
  - H. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
    1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
  - I. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
    1. Provide separate facilities for male and female personnel.
  - J. Wash facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
    1. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
  - K. Drinking-water facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.
    1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45° F to 55° F.
  - L. Sewers and drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
  2. Connect temporary sewers to the municipal system, as directed by sewer department officials.
  3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- M. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

### 3.03 SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 FT of building lines. Comply with requirements of NFPA 241.
- C. Field offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:
1. Furnish with a desk and chairs, a file cabinet, plan table, plan rack, and a bookcase.
  2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.
- D. Storage and fabrication sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.
- E. Temporary paving: Construct and maintain temporary roads and paving to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Architect.
1. Paving: Comply with requirements of Division 2 grading specifications for construction and maintenance of temporary paving.
  2. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
  3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.
  4. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.
- F. Dewatering facilities and drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
- G. Temporary enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

1. Where heat is needed, and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 SF or less with plywood or similar materials.
  3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
  4. Where temporary wood or plywood enclosure exceeds 100 SF in area, use UL labeled, fire-retardant-treated material for framing and main sheathing.
- H. Temporary lifts and hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary elevator use (where applicable): Refer to Division 14 Sections for elevators.
- J. Project identification and temporary signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
1. Project identification signs: Engage an experienced sign painter to apply graphics. Submit sketch of sign to Architect for approval prior to fabrication. Include:
    - a. Project name.
    - b. Owner: Collin County.
    - c. Architect: Spurgin & Associates Architects.
    - d. Contractor: General Contractor awarded this Project.
  2. Temporary signs: Prepare signs to provide directional information to construction personnel and visitors.
- K. Temporary exterior lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.
- L. Collection and disposal of waste: Collect waste from construction areas and elsewhere day. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
- M. Rodent and pest control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- N. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

### 3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Permanent fire protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, warning signs, and lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- E. Enclosure fence: Before excavation begins, install an enclosure fence with lockable entrance gates at the entrance to the site. Provide protective fencing where required around the site as determined by Contractor sufficient to accommodate and protect construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
1. Provide open-mesh, chain link fencing with posts set in a compacted mixture of gravel and earth.
- F. Security enclosure and lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Environmental protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

### 3.05 CONSTRUCTION CLEANING

- A. General:
1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
  2. Do not allow accumulation of scrap, debris, waste material and other items not required for construction of this Work.
  3. At least twice each month, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
  4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
- B. Site:
1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
  2. Maintain the site in a neat and orderly condition at all times.
- C. Structures:
1. Weekly, and more often if necessary, inspect the structure and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
  2. Weekly, and more often if necessary, sweep interior spaces clean.
    - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.

3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
  - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

### 3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
  2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
  3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
    - a. Replace air filters and clean inside of ductwork and housings.
    - b. Replace significantly worn parts and parts subject to unusual operating conditions.
    - c. Replace lamps burned out or noticeably dimmed by hours of use.

#### END OF TEMPORARY FACILITIES & CONTROLS



**01 60 00**  
**PRODUCT REQUIREMENTS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Related work:
  - 1. Section 01 33 00: Submittal Procedures: Specifies requirements for submittal of the Contractor's Construction Schedule.
  - 2. Section 01 42 00: References: Specifies the applicability of industry standards to products specified.
  - 3. Section 01 62 00: Product Options: Specifies administrative procedures for handling requests for substitutions made after award of the Contract.

1.02 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems", "structure", "finishes", "accessories", and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
  - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
    - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
    - b. "Foreign Products" as distinguished from "domestic products" are items substantially manufactured (50% or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50%) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
  - 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
  - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.03 QUALITY ASSURANCE

- A. Source limitations: To the fullest extent possible, provide products of the same kind from a single source.
  - 1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.
- B. Compatibility of options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
  - 1. Each prime contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime of separate contractors.
  - 2. If a dispute arises between prime contractors over concurrently selectable, but incompatible products, the Architect will determine which products shall be retained and which are incompatible and must be replaced.

- C. Foreign product limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:
  - 1. No available domestic product complies with the Contract Documents.
  - 2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.
- D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
  - 1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
  - 2. Equipment nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.

#### 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
  - 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
  - 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
  - 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
  - 7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## 2.0 PRODUCTS

### 2.01 PRODUCT SELECTION

- A. General product requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
  - 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
  - 2. Standard products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product selection procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:

1. Proprietary specification requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
2. Semi-proprietary specification requirements: Where Specifications name two (2) or more products or manufacturers, provide one (1) of the products indicated. No substitutions will be permitted.
  - a. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with Section 01 62 00 Product Options to obtain approval for use of an unnamed product.
3. Nonproprietary specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Section 01 62 00 Product Options to obtain approval for use of an unnamed product.
4. Descriptive specification requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. Performance specification requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
  - a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
6. Compliance with standards, codes, and regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
7. Visual matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
  - a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with Section 01 62 00 Product Options for selection of a matching product in another product category.
8. Visual selection: Where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.
9. Allowances: Refer to individual Specification Sections and Section 01 21 00 Allowances for allowances that control product selection and for procedures required for processing such selections.

### 3.0 EXECUTION

#### 3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
  1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

#### END OF PRODUCT REQUIREMENTS

**01 62 00**  
**PRODUCT OPTIONS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Related work:
  - 1. Section 01 33 00: Submittal Procedures: Specifies requirements for submittal of the Contractor's Construction Schedule.
  - 2. Section 01 42 00: References: Specifies the applicability of industry standards to products specified.
  - 3. Section 01 60 00: Product Requirements: Specifies requirements governing the Contractor's selection of products and product options.

1.02 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:
  - 1. Revisions to the Contract Documents requested by the Owner or Architect.
  - 2. Specified options of products and construction methods included in the Contract Documents.
  - 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.03 SUBMITTALS

- A. Substitution request submittal: The Architect will consider requests for substitution if received within sixty (60) days after commencement of the Work. Requests received more than sixty (60) days after commencement of the Work may be considered or rejected at the discretion of the Architect.
  - 1. Submit three (3) copies of each request for substitution for consideration. Submit requests on the form included at the end of this Section according to procedures required for change-order proposals.
  - 2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
  - 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors, that will be necessary to accommodate the proposed substitution.
    - b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
    - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
    - d. Samples, where applicable or requested.
    - e. A statement indicating the substitutions effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    - f. Cost information, including a proposal of the net change, if any in the Contract Sum.

- g. The Contractor's certification that the proposed substitution proposed is equal to or better in every significant respect to that required in the Contract Documents and is appropriate for the applications indicated.
  - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
4. Architect's action: If necessary, the Architect will request additional information or documentation for evaluation. The Architect will notify the Contractor of acceptance or rejection of the substitution by return of the substitution request form.
- a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.
  - b. The Architect's decision of acceptance or non-acceptance of a proposed substitution shall be final.

## 2.0 PRODUCTS

### 2.01 SUBSTITUTIONS

- A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.
- 1. Extensive revisions to the Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of the Contract Documents.
  - 3. The request is timely, fully documented, and properly submitted.
  - 4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
  - 5. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
  - 6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.
  - 7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  - 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
  - 9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
  - 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
  - 11. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of products.
- B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

- C. Failure of timely order: The Contractor is responsible for assuring the timely order of all materials specified. If a specified material, or color of material cannot be delivered by the contract completion date, due to failure to order the material in a timely manner, the Contractor shall be responsible for supplying an equal or better material. The Architect shall be the sole determinant of the approved substitute material. The Contractor shall also be charged an amount equal to five percent (5%) of the value of the specified material. This amount shall be credited to the Owner through a Change Order to the contract. The word "material", as used in this Section, includes all items specified in the Specifications or shown on the Drawings.

### 3.0 EXECUTION

#### 3.01 SUBSTITUTION REQUEST FORMS

- A. The Contractor shall submit requests for substitutions on the form included on the following pages.

**SUBSTITUTION REQUEST FORM**

Date: \_\_\_\_\_

Architect's Project No.: \_\_\_\_\_

Project: \_\_\_\_\_

To: SPURGIN & ASSOCIATES ARCHITECTS  
103 W. Louisiana Street  
McKinney, Texas 75069-4413

From: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

=====

Contractor hereby requests acceptance of the following product or system as substitution in accordance with provisions of Section 01 62 00 of the Specifications.

1. SPECIFIED PRODUCT OR SYSTEM:

Substitution request for: \_\_\_\_\_

Specification Section No.: \_\_\_\_\_ Article: \_\_\_\_\_

2. SUPPORTING DATA:

\_\_\_\_\_ Product data adequate for evaluation of the request for proposed

\_\_\_\_\_ Sample is attached.

\_\_\_\_\_ Sample will be sent upon Architect/Engineer's request.

3. QUALITY COMPARISON (Add additional sheets if necessary)

	SPECIFIED PRODUCT	SUBSTITUTION
Name, Brand:	_____	_____
Catalog No.:	_____	_____
Manufacturer:	_____	_____
Vendor:	_____	_____
Significant Variations:	_____	_____
Maintenance Service Available:	_____	Yes _____ No _____
Spare Parts Source:	_____	

Warranty Provided: \_\_\_\_\_ Yes \_\_\_\_\_ Years \_\_\_\_\_ No

By Whom: \_\_\_\_\_

4. PREVIOUS INSTALLATIONS:

Identification of similar projects on which proposed substitution was used:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_

Address: \_\_\_\_\_ Owner: \_\_\_\_\_

\_\_\_\_\_ Date Installed: \_\_\_\_\_

5. REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM(S):

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

6. EFFECT OF SUBSTITUTION:

Does the proposed substitution affect other work (adverse or otherwise):

\_\_\_\_\_ No \_\_\_\_\_ Yes (if yes, explain) \_\_\_\_\_

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

Substitution Changes Contract Time:

\_\_\_\_\_ No \_\_\_\_\_ Yes (if yes, Add/Deduct \_\_\_\_\_ Days)

Substitution requires dimensional revisions or redesign of the work:

\_\_\_\_\_ No \_\_\_\_\_ Yes (if yes, attach explanation data)



7. CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT DOCUMENTS:

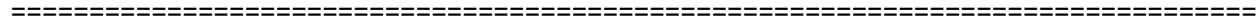
I/we have investigated the proposed substitution. I/we:

- \* believe that it is equal or superior in all respects including function, appearance, and quality to specified product, except as stated above;
- \* will provide same warranty and servicing requirements as specified for specified product;
- \* have included complete implications of the substitution;
- \* will pay for changes to the building design and special inspection costs caused by the use of this product;
- \* will coordinate the incorporation of the proposed substitution in the work;
- \* waive future claims for added cost to Contract caused by the substitution.

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_ By: \_\_\_\_\_

Answer all questions and complete all blanks - use "NA" if not applicable. Unresponsive or incomplete request will be rejected.



ARCHITECT'S REVIEW AND ACTION

\_\_\_\_\_ Resubmit substitution request  
 \_\_\_\_\_ Provide more information in the following areas:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Sign Contractor's Statement of Conformance  
 \_\_\_\_\_ Substitution is accepted.  
 \_\_\_\_\_ Substitution is accepted, with the following comments:

\_\_\_\_\_

\_\_\_\_\_ Substitution is rejected.  
 \_\_\_\_\_ Substitution Request received too late.

\_\_\_\_\_ SPURGIN & ASSOCIATES ARCHITECTS

\_\_\_\_\_ Date

END OF PRODUCT OPTIONS

**01 73 29**  
**CUTTING & PATCHING**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for cutting and patching.
- B. Related work:
  - 1. In addition to other requirements specified, upon the Architect's request uncover work to provide for inspection of covered work and remove samples of installed materials for testing.
  - 2. Do not cut or alter work performed under separate contracts without the Architect's written permission.
  - 3. Section 01 31 00: Project Management & Coordination.
  - 4. Section 02 41 19: Selective Structure Demolition.
  - 5. Refer to other Sections of these Specifications for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
    - a. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 21-28 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.02 SUBMITTALS

- A. Cutting and patching proposal: Submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Owner requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
  - 3. List products to be used and firms or entities that will perform Work.
  - 4. Indicate dates when cutting and patching will be performed.
  - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  - 6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
  - 7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

1.03 QUALITY ASSURANCE

- A. Requirements for structural work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
  - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Structural concrete.
    - d. Structural steel.
    - e. Lintels.
    - f. Timber and primary wood framing.
    - g. Structural decking.
    - h. Stair systems.
    - i. Miscellaneous structural metals.

- j. Exterior curtain-wall construction.
    - k. Equipment supports.
    - l. Piping, ductwork, vessels, and equipment.
    - m. Structural systems of special construction in Division 13 Sections.
  - B. Operational limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
    - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
      - a. Primary operational systems and equipment.
      - b. Air or smoke barriers.
      - c. Water, moisture or vapor barriers.
      - d. Membranes and flashings.
      - e. Fire protection systems.
      - f. Noise and vibration control elements and systems.
      - g. Control systems.
      - h. Communication systems.
      - i. Conveying systems.
      - j. Electrical wiring systems.
      - k. Operating systems of special construction in Division 13 Sections.
  - C. Visual requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
    - 1. If possible, retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
      - a. Processed concrete finishes.
      - b. Stonework and stone masonry.
      - c. Ornamental metal.
      - d. Matched-veneer woodwork.
      - e. Preformed metal panels.
      - f. Firestopping.
      - g. Window wall system.
      - h. Stucco and ornamental plaster.
      - i. Acoustical ceilings.
      - j. Terrazzo.
      - k. Finished wood flooring.
      - l. Fluid-applied flooring.
      - m. Carpeting.
      - n. Aggregate wall coating.
      - o. Wall covering.
      - p. Swimming pool finishes.
      - q. HVAC enclosures, cabinets or covers.

#### 1.04 WARRANTY

- A. Existing warranties: Replace, patch and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

#### 2.0 PRODUCTS

##### 2.01 MATERIALS

- A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

### 3.0 EXECUTION

#### 3.01 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
  - 1. Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

#### 3.02 PREPARATION

- A. Temporary support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

#### 3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or diamond-core drill.
  - 4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
  - 5. Where services are required to be removed, relocated or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
4. Patch, repair or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.04 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing material. Restore damaged pipe covering to its original condition.

END OF CUTTING & PATCHING

**01 77 00**  
**CLOSEOUT PROCEDURES**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 48.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show one hundred percent (100%) completion for the portion of the Work claimed as substantially complete.
    - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    - b. If one hundred percent (100%) completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
  - 2. Advise the Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Submit Record Drawings, Maintenance Manuals, damage or settlement surveys, property surveys, and similar final record information.
  - 6. Deliver tools, spare parts, extra stock, and similar items.
  - 7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
  - 8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel.
  - 9. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
  - 10. Complete final cleanup requirements, including touchup painting.
  - 11. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
  - 1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
  - 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.03 FINAL ACCEPTANCE

- A. Preliminary procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
  - 1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.

- a. Submit Contractor's Affidavit of Payments of Debts and Claims (AIA Form G706).
    - b. Submit Contractor's Affidavit of Release of Liens (AIA Form G706A).
  2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
  3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, endorsed and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Architect.
  4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
  5. Submit Consent of Surety to Final Payment (AIA Form G707).
  6. Submit a final liquidated damages settlement statement.
  7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final inspection. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  2. If necessary, reinspection will be repeated.

## 2.0 PRODUCTS

Not Applicable to this Section.

## 3.0 EXECUTION

### 3.01 CLOSEOUT PROCEDURES

- A. Operation and maintenance instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if Installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
1. Maintenance Manuals.
  2. Record Documents.
  3. Spare parts and materials.
  4. Tools.
  5. Lubricants.
  6. Fuels.
  7. Identification systems.
  8. Control sequences.
  9. Hazards.
  10. Cleaning.
  11. Warranties and bonds.
  12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
1. Startup
  2. Shutdown.
  3. Emergency operations.
  4. Noise and vibration adjustments.
  5. Safety procedures.
  6. Economy and efficiency adjustments.
  7. Effective energy utilization.

### 3.02 FINAL CLEANING

- A. General: The General Conditions require general cleaning during construction. Regular cleaning is included in Section 01 50 00 Temporary Facilities & Controls.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Cleaning each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification for Substantial Completion.
    - a. Remove labels that are not permanent labels.
    - b. Clean transparent materials including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
    - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free conditions, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
    - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps. Replace all HVAC filters.
    - e. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved or planted to a smooth, even-textured surface.
- C. Removal of protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
  - 1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF CLOSEOUT PROCEDURES



**01 78 00**  
**CLOSEOUT SUBMITTALS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout submittals required by the Contract Documents at the completion of the project including, but not limited to, the following:
  - 1. Project record documents, including operation and maintenance manuals.
  - 2. Warranties and bonds, including manufacturer's standard warranties on products and special warranties.
- B. Related work:
  - 1. Refer to General Conditions for terms of the Contractor's period for correction of the Work (one year from Date of Substantial Completion).
  - 2. Section 01 33 00: Submittal Procedures: Specifies procedures for submitting warranties.
  - 3. Section 01 77 00: Closeout Procedures: Specifies contract closeout procedures.
  - 4. Divisions 2 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.
  - 5. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- C. Disclaimers and limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.02 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.03 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Architect's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue- or black-line prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
  - 1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
  - 2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
  - 3. Note related change order numbers where applicable.
  - 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.

1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
  2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
  3. Note related record drawing information and Product Data.
  4. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.
- D. Record Product Data: Maintain one (1) copy of each Product Data submittal. Note related Change Orders and markup of Record Drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
  2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
  3. Upon completion of markup, submit complete set of record Product Data to the Architect for the Owner's records.
- E. Record Sample submittals: Immediately prior to Substantial Completion, the Contractor shall meet with the Architect and the Owner's personnel at the Project site to determine which Samples are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding delivery to the Owner's Sample storage area.
- F. Miscellaneous record submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Architect for the Owner's records.
- G. Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2 IN, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends and holidays.
  2. Emergency instructions.
  3. Spare parts list.
  4. Copies of warranties.
  5. Wiring diagrams.
  6. Recommended "turn-around" cycles.
  7. Inspection procedures.
  8. Shop Drawings and Product Data.
  9. Fixture lamping schedule.

#### 1.04 WARRANTY REQUIREMENTS

- A. Related damages and losses: When correcting warranted construction that has failed, remove and replace other construction that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. Owner's recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 1. Rejection of warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

#### 1.05 WARRANTY AND BOND SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate for Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
  - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the Work.
- B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
- C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
  - 1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- D. Form of submittal: At Final Completion compile two (2) copies of each required warranty and bond properly executed by the Contractor, or by the Contractor and a subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and bonds in heavy duty, commercial quality, durable 3-ring, vinyl covered loose leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 1/2 IN x 11 IN paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
  - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES AND BONDS", Project title or name, and name of the Contractor.
  - 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

#### 2.0 PRODUCTS

Not Applicable to this Section.

3.0 EXECUTION

3.01 WARRANTIES

- A. Provide warranties and bonds on products and installations as specified in other Sections of these Specifications.

END OF CLOSEOUT SUBMITTALS

**01 78 33**  
**WARRANTIES & BONDS**

1.0 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
- B. Related work:
  - 1. Refer to General Conditions for terms of the Contractor's period for correction of the Work (one year from Date of Substantial Completion).
  - 2. Section 01 33 00: Submittal Procedures: Specifies procedures for submitting warranties.
  - 3. Section 01 77 00: Closeout Procedures: Specifies contract closeout procedures.
  - 4. Divisions 2 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.
  - 5. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- C. Disclaimers and limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.02 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.03 WARRANTY REQUIREMENTS

- A. Related damages and losses: When correcting warranted construction that has failed, remove and replace other construction that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
- E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

## 1.04 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate for Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
  - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the Work.
- B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
- C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
  - 1. Refer to Divisions 2 through 48 Sections for specific content requirements and particular requirements for submitting special warranties.
- D. Form of submittal: At Final Completion compile 2 copies of each required warranty and bond properly executed by the Contractor, or by the Contractor and a subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and bonds in heavy duty, commercial quality, durable 3-ring, vinyl covered loose leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 1/2 IN x 11 IN paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
  - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES AND BONDS", Project title or name, and name of the Contractor.
  - 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

## 2.0 PRODUCTS

Not Applicable to this Section.

## 3.0 EXECUTION

### 3.01 WARRANTIES

- A. Provide warranties and bonds on products and installations as specified in other Sections of these Specifications.

END OF WARRANTIES & BONDS

**02 41 19**  
**SELECTIVE STRUCTURE DEMOLITION**

1.0 GENERAL

1.01 SUMMARY

- A. In accordance with pertinent provisions of this Section, carefully demolish and remove from the structure those items scheduled to be so demolished and removed.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

2.0 PRODUCTS

Not applicable to this Section.

3.0 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 DEMOLITION

- A. By careful study of the Contract Documents, determine the location and extent of selective demolition to be performed.
- B. In company with the Architect, verify the extent and location of selective demolition required.
1. Carefully identify limits of selective demolition.
  2. Mark interface surfaces as required to enable workmen also to identify items to be removed and items to be left in place intact.
- C. Prepare and follow an organized plan for demolition and removal of items.
1. Shut off, cap and otherwise protect existing public utility lines in accordance with the requirements of the public agency or utility having jurisdiction.
  2. Provide temporary utilities as may be required to maintain service to existing buildings.
  3. Completely remove items scheduled to be so demolished and removed, leaving surfaces clean, solid and ready to receive new materials specified elsewhere.
  4. Accomplish work in a careful manner to prevent damage to existing materials to remain.
  5. In all activities, comply with pertinent regulations of governmental agencies having jurisdiction.
- D. Demolished material shall be considered to be property of the Contractor and shall be completely removed from the job site unless otherwise instructed in the Drawings.
- E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.
- F. Roofs of existing buildings shall be maintained waterproof. Contractor shall provide temporary roofing if required.

3.03 RECYCLING

- A. Items scheduled to be demolished and removed from the site shall be recycled or returned to manufacturers of similar products for recycling to the maximum extent practical, including but not necessarily limited to:
1. Carpet floor covering.
  2. Acoustical ceiling panels.
  3. Metal ceiling grid.
  4. Metal studs.

3.04 REPLACEMENTS

- A. In the event of demolition of items not so scheduled to be demolished, promptly replace such items to the approval of the Architect and at no additional cost to the Owner.

END OF SECTION



**03 10 00**  
**CONCRETE FORMING & ACCESSORIES**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide formwork in accordance with provisions of this Section for cast-in-place concrete shown on the Drawings or required by other Sections of these Specifications, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.
  - B. Related work:
    - 1. Section 03 20 00: Concrete Reinforcing.
    - 2. Section 03 30 00: Cast-in-Place Concrete.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit manufacturer's data and installation instructions for proprietary materials including form coatings, ties, and accessories.
- 1.03 REFERENCES
  - A. ACI 347: Guide to Formwork for Concrete.
  - B. ASTM D1752: Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- 1.04 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
  - B. Design of formwork is the Contractor's responsibility. Formwork shall be designed and engineered to support all loads without distortion or excessive deflection.
  - C. Standards: In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.
- 1.05 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
- 2.0 PRODUCTS
- 2.01 FORM MATERIALS
  - A. Except for metal forms, use new materials. Materials may be re-used during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.
  - B. For footings and foundations, use Southern Pine or Douglas Fir boards or planks secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
  - C. For studs, wales and supports, use standard grade or better Southern Pine, dimensions as required to support the loads but not less than 2 x 4 IN.
  - D. Wood Forms:
    - 1. Exposed concrete surfaces: Use smooth face, 5 plyform plywood or line with 3 ply (1/4 IN) smooth face plywood.
    - 2. Unexposed concrete surfaces: Southern Pine and B-B Plyform lumber.
  - E. Metal Forms: Use metal forms which are clean, unpainted and in good condition. Damaged or indented forms will not be accepted.
- 2.02 FORM RELEASE AGENT
  - A. Use paraffin base release agent which is non-staining, minimizes formation of 'bug-holes' in surface of concrete, and will not impair subsequent treatments of concrete surfaces.

- 2.03 CHAMFER STRIPS
- A. Use wood or vinyl chamfer strips of size indicated on Drawings or, if not indicated on Drawings, use 3/4 x 3/4 IN.
- 2.04 FORM SEALER
- A. Provide "Synthex" as manufactured by Industrial Synthetics Corp., or "Pre-Form" as manufactured by Nox-Crete Co.
- 2.05 COMPRESSIBLE FILLER
- A. Provide Premolded Sponge Rubber and Cork, non-asphaltic, complying with ASTM D1752, Type 1.
- 2.06 CONSTRUCTION JOINT FORM
- A. Provide construction joint form equal to "Keyed-Kold Joint" as manufactured by The Burke Company.
- 2.07 WATERSTOPS
- A. Provide "Type No. 500 Durajoint Polyvinyl Water Stops" as manufactured by W.R. Grace or "Mastic Waterstop" as manufactured by Synko-Flex Products Co.
- 2.08 FORM TIES
- A. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders with the following characteristics:
1. Bolts, rods, or patented devices having a minimum tensile strength of 3,000 LBS when fully assembled.
  2. Ties shall be adjustable in length and free of lugs, cones, washers, or other features which would leave a hole or depression larger than 7/8 IN DIA back of the exposed surface of the concrete.
  3. Ties shall be of such construction that when the forms are removed, there will not be metal remaining within 1 IN of the finished surface of the concrete.
- B. Location of ties:
1. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level.
- 2.09 DESIGN OF FORMWORK
- A. General:
1. Design, erect, support, brace and maintain formwork so it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.
  2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
  3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
  4. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of the structure during construction.
  5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
  6. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
  7. Support form materials by structural members spaced sufficiently close to prevent objectionable deflection.
  8. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within the allowable tolerances.

9. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins.
10. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 FORM CONSTRUCTION

- A. General:
  1. Construct forms complying with ACI 347 to the exact sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades and level and plumb work in the finished structure.
  2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts and other features as required.
- B. Fabrication:
  1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
  2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
  3. Kerf wood inserts for forming keyways, reglets, recesses, etc., to prevent swelling and assure ease of removal.
  4. Provide top forms for inclined surfaces where so directed by the Architect.
- C. Forms for exposed concrete:
  1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
  2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back the joints with extra studs or girts to maintain true, square intersections.
  3. Use extra studs, wales and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
- D. Corner treatment:
  1. Unless shown otherwise, form chamfers with 3/4 x 3/4 IN strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
  2. Extend terminal edges to required limit and miter the chamfer strips at changes in direction.
- E. Locate control joints as indicated on the Drawings and, where required but not shown on the Drawings, as approved by the Architect.
- F. Cleaning: Immediately before placing concrete, clean forms free of chips, sawdust, wire clippings and other debris.
- G. Provisions for other trades:
  1. Provide openings in concrete formwork to accommodate work of other trades.
  2. Verify size and location of openings, recesses and chases with the trade requiring such items.
  3. Accurately place and securely support items to be built into the concrete.

#### 3.03 FORM COATINGS

- A. Coat form contact surfaces with form coating compound before reinforcement is placed.
  1. Do not allow excess form coating material to accumulate in the forms.
  2. Do not allow form coating to come in contact with reinforcing steel or hardened concrete surfaces against which fresh concrete will be placed.

3. Apply the form coating material in strict accordance with its manufacturer's recommendations.

### 3.04 REMOVAL OF FORMS

- A. General:
  1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety.
  2. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load upon it, and the added load of construction.
  3. For normal conditions with temperature above 40°F, MIN period of time before removal shall be:
    - a. Side forms of beams & walls - 3 days
    - b. Bottom forms of slabs - 7 days
    - c. Bottom forms of beams and joists - 18 days
  4. Bottom of slabs, beams and joists shall be reshored for an additional 10 days. If temperature falls below 40°F, the forms shall remain in place an additional time equal to the amount of time less than 40°F.
- B. Wood forms shall be completely removed under all floors, ramps, steps, and other similar places to avoid termite infestation.
- C. Finished surfaces:
  1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp and unbroken.
  2. Release sleeve nuts or clamps and pull the form ties neatly.
  3. Do not permit steel spreaders, form ties or other metal to project from or be visible on any concrete surface except where so shown on the Drawings.
  4. Solidly pack form tie holes, rod holes and similar holes in the concrete using cement grout. Flush holes with water before packing, screed off flush, and grind to match adjacent surfaces.

### 3.05 CONSTRUCTION JOINT

- A. Except as otherwise specifically indicated on the Drawings, each concrete member shall be considered as a single unit of operation, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, the same shall be located in the middle third of spans.
- B. Additional construction joints shall not be made under any circumstances without prior approval by the Architect. All construction joints shall be either plumb or level. Provide appropriate keys and dowels in all construction joints, whether horizontal or vertical.

### 3.06 WATERSTOPS

- A. Provide continuous waterstops in all joints at and below grade. Position waterstops accurately and support against displacement. Splice sections watertight in accordance with manufacturer's recommendations.

END OF SECTION

**03 20 00**  
**CONCRETE REINFORCING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide concrete reinforcing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.
- B. Related work:
  - 1. Section 03 10 00: Concrete Forming & Accessories.
  - 2. Section 03 30 00: Cast-in-Place Concrete.

1.02 REFERENCES

- A. ACI 315: Standard Practice for Detailing Reinforced Concrete Structures.
- B. ACI 318: Building Code Requirements for Structural Concrete.
- C. ASTM A82: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- D. ASTM A185: Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- E. ASTM A615: Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Shop Drawings showing location, size, bending and spacing of reinforcement, anchors and other items, if any, provided under this Section.
  - 2. Certified copies of reinforcing steel mill test reports, evidencing compliance with the requirements of these Specifications.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 318.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery and storage:
  - 1. Deliver to site in bundles marked with metal tags indicating bar size, length and mark.
  - 2. Use necessary precautions to maintain identification after bundles are broken.
  - 3. Unload carefully to prevent damage.
  - 4. Store above ground in dry, well drained area in a manner to prevent excessive rusting and fouling with mud, dirt, grease and other bond-breaking coatings.

2.0 PRODUCTS

2.01 REINFORCEMENT MATERIALS AND ACCESSORIES

- A. Reinforcing bars:
  - 1. Provide deformed billet steel bars of domestic manufacture conforming to the requirement of "Specifications for Billet-Steel Concrete Reinforcing Bars", ASTM A615, Grade 40 or 60 as noted on drawings.
  - 2. Bars shall be millmarked by stamping or by rolling impression designating the type of steel.

- B. Welded wire fabric reinforcing:
  - 1. Provide new, flat cut sheets complying with ASTM A185, with steel wire spot welded at intersections and of sizes indicated on the Drawings. Rolls are not acceptable.
- C. Steel wire:
  - 1. Comply with ASTM A82.
  - 2. For tie wire, comply with FS QQ-W-461, annealed steel, black, 16 gage minimum.
- D. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place:
  - 1. Provide bar supports, chairs, spacers, etc., complying with ACI 315.
  - 2. Do not use wood, brick or other non-complying material.
  - 3. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  - 4. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized or plastic-protected legs.

## 2.02 FABRICATION

- A. General:
  - 1. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with ACI 318.
  - 2. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.
  - 3. Bars shall be bundled and tagged for specific location.
  - 4. Bars shall be bent cold. Heating of reinforcing will not be permitted.
  - 5. Reinforcement with any of the following defects will not be acceptable.
    - a. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances.
    - b. Bends or kinks not shown on the Drawings.
    - c. Bars with reduced cross-section due to excessive rusting or other cause.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 INSTALLATION

- A. General:
  - 1. Comply with the specified standards for detail and method of placing reinforcement and supports, except as may be modified herein.
  - 2. Avoid cutting or puncturing vapor retarder during reinforcement placement.
  - 3. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
  - 4. Accurately position, support and secure reinforcement against displacement by formwork, construction and concrete placement operations.
  - 5. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required.
  - 6. Place reinforcement to obtain minimum coverages for concrete protection as follows:
    - a. Concrete placed against earth: 3 IN
    - b. Formed concrete against earth: 2 IN
    - c. Beams to ties/stirrups: 1-1/2 IN
    - d. Top and bottom of slabs: 3/4 IN
  - 7. Arrange, space and securely tie bars and bar supports together with the specified tie wire to hold reinforcement in position during concrete placement operations.
  - 8. Set wire ties so twisted ends are directed away from exposed concrete surfaces.

- B. Provide sufficient number of supports, and of strength to carry the reinforcement.
- C. Do not place reinforcing bars more than 2 IN beyond last leg of any continuous bar support.
  
- D. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

### 3.03 SPLICES

- A. Lap splices:
  - 1. Tie securely with the specified wire to prevent displacement of splices during placement of concrete.
  - 2. Bars shall be lapped 36 DIA at splices; maintain 24 IN MIN lap.
- B. Corner splices: Provide corner bars in all beams of same size as beam reinforcing; lap 30 bar DIA.
- C. Do not splice bars except at locations shown on the Drawings, except as otherwise specifically approved by the Architect.

### 3.04 DOWELS

- A. Dowels shall be as indicated on the Drawings or in other Sections of these Specifications, or same size and spacing as adjoining main bars, MIN.

### 3.05 WELDED WIRE FABRIC PLACEMENT

- A. Install fabric in longest practical lengths.
- B. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
- C. Offset end laps in adjacent widths to prevent continuous lap.
- D. Keep wire in proper position during concrete placements.
- E. Lap splices shall be in accordance with ACI 318.

END OF SECTION

**03 30 00**  
**CAST-IN-PLACE CONCRETE**

1.0 GENERAL

1.01 SUMMARY

- A. Provide cast-in-place where shown on the Drawings, as specified herein and as needed for a complete and proper installation, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.
- B. Related work:
  - 1. Section 01 45 00: Quality Control.
  - 2. Section 03 10 00: Concrete Forming & Accessories.
  - 3. Section 03 20 00: Concrete Reinforcing.
  - 4. Section 03 35 00: Concrete Finishing.
  - 5. Section 03 39 00: Concrete Curing.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Five (5) copies of concrete design mix by testing laboratory for each mix used.

1.03 REFERENCES

- A. ACI 318: Building Code Requirements for Structural Concrete.
- B. ASTM C33: Standard Specification for Concrete Aggregates.
- C. ASTM C94: Standard Specification for Ready-Mixed Concrete.
- D. ASTM C150: Standard Specification for Portland Cement.
- E. ASTM C494: Standard Specification for Chemical Admixtures for Concrete.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 318.
- C. Do not commence placement of concrete until mix designs have been reviewed and approved by the Architect and all governmental agencies having jurisdiction, and until copies are at the job site, the batch plant, and the building department.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

1.05 SITE CONDITIONS

- A. Protect adjacent finish materials against spatter during concrete placement.
- B. Do not place concrete when air temperature is below 40°F unless means are provided to heat and maintain the temperature of the concrete at 50°F MIN for 7 days.

2.0 PRODUCTS

2.01 CEMENT

- A. Provide a standard brand of Portland cement complying with ASTM C150, Type I. Do not change the brand of cement during progress of the Work except as approved in writing by the Architect.

2.02 AGGREGATES

- A. General:
  - 1. Provide hardrock aggregate complying with ASTM C33, with additional attributes as specified herein.
  - 2. No fly ash will be allowed.



- B. Fine Aggregate:
  - 1. Provide clean, hard, durable, uncoated natural sand, free from silt, loam, and clay.
- C. Coarse Aggregate:
  - 1. Provide clean, hard, crushed stone or washed gravel with gradation conforming to:
    - a. Size Number 467 (1-1/2 IN) in Table II for drilled piers.
    - b. Size Number 67 (3/4 IN) in Table II for all other structural concrete including columns, beams, slabs, walls, etc.

### 2.03 WATER

- A. Use only water which is clean and free from deleterious amounts of oil, acid, alkali, salt, vegetable matter and organic materials.

### 2.04 ADMIXTURES

- A. Use a water reducing compound complying with ASTM C494 equal to Master Builders "Pozzolith Normal".
- B. Where controlled setting is desired, Master Builders "Pozzolith Retarder" or "Pozzolith High Early" may be used subject to prior approval of Architect.

### 2.05 CEMENT GROUT

- A. Use non-shrink premixed grout equal to "Embeco" as manufactured by Master Builders.

### 2.06 CONCRETE MIXES

- A. Provide and pay for mix designs prepared by an approved testing laboratory to produce required strength.
- B. Strength of concrete:
  - 1. Allowable stresses for the design of cast-in-place concrete members for the structures are based on the specified MIN compressive strength of the concrete at 28 days or the earlier age at which the concrete may be expected to receive its full load.
    - a. All concrete shall develop ultimate compressive strengths indicated on the Drawings.
    - b. The 7 day compressive strength shall exceed 65% of the 28 day design strength.
- C. MIN cement content:
  - 1. 3,000 PSI: 5 sacks per CY.
- D. Slumps for various types of construction:
 

1. Drilled piers:	3 to 5 IN
2. Slabs:	3 to 5 IN
3. Grade beams:	3 to 5 IN
4. Walls:	3 to 5 IN
5. Tolerance shall be plus 1/2 IN and minus 1 IN.	

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 CONCRETE MIXING AND TRANSPORT

- A. Mix and transport ready-mix concrete in accordance with ASTM C94, latest edition.
- B. Arrange and maintain delivery schedule so that concrete is not allowed to stand in trucks for more than 45 minutes when temperature is over 80°F and 60 minutes when temperature is less than 80°F.
- C. Delivery tickets shall indicate the date and time of dispatch, the strength of concrete in the load, the quantity of cement per cubic yard and the type and quantity of admixture used.

- D. Concrete consistency:
  - 1. Use the amount of water established by the approved mix design.
    - a. Do not exceed the MAX quantity specified for the grade of concrete.
    - b. Use the MIN amount of water necessary to produce concrete of the workability required by the Architect.
    - c. Do not add water on the job without Architect's prior approval.

### 3.03 PLACING CONCRETE

- A. Notification:
  - 1. Notify the Architect of all placements of concrete sufficiently in advance to allow for inspection of formwork, reinforcing and embedded items.
- B. Construction joints:
  - 1. Location of construction joints shall be subject to approval of the Architect.
  - 2. Reinforcing steel shall be continuous through the joints.
  - 3. Construction joints in beams shall have additional reinforcing to that scheduled for the member.
    - a. Quantity of additional reinforcing shall be 0.5% of the cross-sectional area of the concrete member and shall extend 40 bar DIA on each side of the joint.
- C. Depositing concrete:
  - 1. Convey to and place concrete in the forms by a method that will prevent segregation of materials.
  - 2. The free fall of concrete dumped or chuted into place shall not exceed 5 FT.
  - 3. Spreading of concrete by means of hoes or shovels shall not exceed 6 FT from the location of deposit.
- D. Vibration:
  - 1. Place concrete with the aid of mechanical vibrating equipment.
  - 2. The intensity of the vibration shall be sufficient to cause flow or settlement of concrete into place and shall be applied at the point of deposit and in the area of freshly placed concrete.
  - 3. The vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures but shall not be long enough to cause segregation of the mix.
  - 4. Vibrations shall be supplemented by hand spading in the corners and along form surfaces while concrete is plastic.

### 3.04 GROUTING AND CEMENT POINTING

- A. General:
  - 1. Perform all mixing and placement in accordance with the manufacturer's recommendations.
  - 2. Grout placement shall proceed in a manner that will assure the filling of all spaces and intimate contact of the grout with contact surfaces.
- B. Surface preparation:
  - 1. Concrete surfaces shall be sound and all surfaces to be in contact with the grout shall be entirely free of oil, grease, laitance, curing compounds, and other deleterious substances.
  - 2. Concrete surfaces shall be rough to assure bond of the grout to the existing concrete.
  - 3. Metal surfaces which are to be in direct contact with the grout shall be thoroughly cleaned immediately before grouting.
  - 4. All surfaces to be grouted shall be completely dry.
- C. Installation:
  - 1. Placement of grout shall be rapid and continuous so as to avoid cold joints.
  - 2. Protect grout from external vibration for 24 HRS MIN.
- D. Curing: Cover all exposed grout with wet burlap immediately after placement. Keep area moist for 48 HRS MIN.

END OF SECTION

**03 35 00**  
**CONCRETE FINISHING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide finishing and sealing of cast-in-place concrete as called for on the Drawings, as specified herein and as needed for a complete and proper installation, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.
- B. Related work:
  - 1. Section 03 30 00: Cast-in-Place Concrete.
  - 2. Section 03 39 00: Concrete Curing.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Certificate:
  - 1. Authorized representative of approved manufacturer of liquid sealing agents shall issue a signed certificate of coverage approving application of liquid sealing agents.
- C. Prepare a test sample of sealing method for Architect's approval prior to floor sealing operations.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

2.0 PRODUCTS

2.01 MATERIALS

- A. General:
  - 1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
  - 2. As required for the Work, provide the following materials, or equals approved in advance by the Architect.
- B. Liquid sealing agent:
  - 1. Deketon as manufactured by Nox-Crete, Inc., distributed by Secure Incorporated, Waxahachie, Texas, Tel. 972/937-0800.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3.0 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 CONCRETE FINISHES

- A. General:
  - 1. All concrete floor slabs to receive smooth trowel finish.
  - 2. Exposed concrete vertical surfaces shall have a smooth rubbed finish.
- B. Floated finish:
  - 1. After the concrete has been placed, jitterbug or tamp slab surfaces, screed to proper elevation, and then float with metal or wood floats.
  - 2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
  - 3. During or after the first floating, check the planeness of the surface with a 10 FT straightedge applied at not less than two (2) different angles.
  - 4. Cut down high spots and fill low spots.
  - 5. Refloat the slab immediately to a uniform sandy texture.
- C. Smooth trowel finish:
  - 1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling.
    - a. Float slabs with power trowels for finish leveling after concrete has sufficiently stiffened to permit the operation.
    - b. Provide hand troweling when a ringing sound is produced as the trowel is moved over the surface.
  - 2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance:
    - a. True plane within 1/8 IN in 10 FT as determined by a 10 FT straightedge placed anywhere on the slab in any direction.
    - b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.
- D. Smooth form finish:
  - 1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
  - 2. Patch tie holes and defects.
  - 3. Remove fins completely.
- E. Smooth rubbed finish:
  - 1. Provide this finish only on a "smooth form finish" base as described above.
    - a. Produce on newly hardened concrete no later than the day following form removal.
    - b. Wet the surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.
    - c. Level offsets and fill voids with the cement paste drawn from the concrete itself by the rubbing process.
    - d. Provide additional mortar composed of one part cement and one part fine sand to assist in rubbing.

### 3.03 CURING

- A. Cure finished concrete in accordance with Section 03 39 00.

### 3.04 SEALING

- A. Clean scheduled floors with clear water to remove all loose dirt and dust. Remove oil, grease, asphalt, and droppage with an approved detergent. Allow floor to dry thoroughly.
- B. Apply sealing compound with a power sprayer to point of saturation and accumulation of surface film. Avoid puddles and runs to low spots. Allow compound to penetrate, then respray only those areas evidencing no surface film. Repeat until a uniform surface film appears over the entire floor.

3.05 PROTECTION

- A. Protect freshly sealed floors until films are hard dry.
- B. Protect finished concrete surfaces from soiling.
- C. Protect finished concrete surfaces from damage from construction equipment, materials, mechanical disturbances such as heavy shock, load stresses, and excessive vibration.

END OF SECTION

**03 39 00**  
**CONCRETE CURING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide curing of cast-in-place concrete as called for on the Drawings, as specified herein and as needed for a complete and proper installation, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.
- B. Related work:
  - 1. Section 03 30 00: Cast-in-Place Concrete.
  - 2. Section 03 35 00: Concrete Finishing.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Certificate:
  - 1. Authorized representative of approved manufacturer of liquid curing agents shall issue a signed certificate of coverage approving application of liquid curing agents.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

2.0 PRODUCTS

2.01 MATERIALS

- A. General:
  - 1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
  - 2. As required for the Work, provide the following materials, or equals approved in advance by the Architect.
- B. Liquid curing agent:
  - 1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water or curing membrane only; do not use chemical cure.
  - 2. Silcoseal 77 as manufactured by Nox-Crete, Inc., distributed by Secure Incorporated, Waxahachie, Texas, Tel. 972/937-0800.
- C. Curing membrane:
  - 1. 6 mil polyethylene film.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3.0 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 CONCRETE FINISHES

- A. Prior to curing concrete, finish concrete in accordance with Section 03 35 00.

3.03 CURING

A. General:

1. Concrete slabs to receive waterproofing or toppings shall be cured by curing membrane method.
2. All other concrete slabs shall be cured by compound method.
3. Maintain concrete between 65°F and 85°F during curing.

B. Membrane method:

1. Immediately following finishing operations spread curing membrane over all exposed concrete surfaces.
2. Lap end and side joints 12 IN MIN and secure with tape.
3. Apply sand on edges of membrane for ballast.
4. Maintain membrane in place for a minimum of 7 days.

C. Compound method:

1. Immediately following finishing operations, apply curing compound to point of rejection and uniform surface film accumulation (typically 200 to 500 SF/GAL). Avoid puddles or excessive accumulation.

3.04 SEALING

- A. Seal cured concrete in accordance with Section 03 35 00.

3.05 PROTECTION

- A. Protect finished concrete surfaces from soiling.
- B. Protect finished concrete surfaces from damage from construction equipment, materials, mechanical disturbances such as heavy shock, load stresses, and excessive vibration.

END OF SECTION

**05 41 00**  
**STRUCTURAL METAL STUD FRAMING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide structural metal stud framing at exterior metal stud framed walls and where shown on the Drawings, as specified herein and as needed for a complete and proper installation including, but not necessarily limited to:
  - 1. Studs.
  - 2. Bridging.
  - 3. Accessories.
- B. Related work:
  - 1. Section 09 29 00: Gypsum Board (including metal drywall studs).

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings in sufficient detail to show layout, sizes, spacings, thicknesses, and types of cold-formed steel framing; fabrication, installation, fastening and anchorage, bridging, bracing, splices, accessories, and interface of the work of this Section with the work of adjacent trades.

1.03 REFERENCES

- A. Conform to AISI Specifications for the Design of Cold-Formed Steel Structural Members.
- B. AISI S200: North American Standard for Cold-Formed Steel Framing-General Provisions.
- C. ASTM A780/780M: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dep Galvanized Coatings.
- D. ASTM C1007: Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.

1.04 SYSTEM DESCRIPTION

- A. Design requirements: Design, fabricate, and install framing system to withstand a 20 PSF uniform windload with a MAX deflection not exceeding L/360.

1.05 QUALITY ASSURANCE

- A. Manufacturer qualifications: Member in good standing of the Steel Framing Industry Association (SFIA).
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage and handling as required by AISI's Code of Standard Practice.

2.0 PRODUCTS

2.01 MANUFACTURER

- A. Design basis: Contract documents are based on cold-formed metal framing products by ClarkDietrich Building Systems, Dallas, Texas, Tel. 214-350-1716, Web [www.clarkdietrich.com](http://www.clarkdietrich.com).



- 2.02 COLD-FORMED STEEL FRAMING MATERIALS
- A. Studs: 18 gage C-shaped steel studs, 4 IN and 8 IN wide with 1-5/8 IN flange and 1/2 IN return, prime coat finish, equal to ClarkDietrich model CSJ.
  - B. Runner tracks: 18 gage U-shaped steel track, 4 IN wide with straight flanges, prime coat finish.
  - C. Bridging: 3/4 IN cold-formed 16 gage channels, pre-notched at 12, 16 and 24 IN OC, black finish.
- 2.03 OTHER MATERIALS
- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 2.04 FABRICATION
- A. Fabricate cold-formed steel 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 steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      - a. Comply with AWS D1.3/D1.3M 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 screws penetrating joined members by no fewer than three exposed screw threads.
    - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
  - B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
  - C. Tolerances: Fabricate assemblies level, plumb, and true to line to MAX allowable variation of 1/8 IN in 10 FT and as follows:
    - 1. Spacing: Space individual framing members no more than plus or minus 1/8 IN from plan location. Cumulative error shall not exceed MIN fastening requirements of sheathing or other finishing materials.
    - 2. Squareness: Fabricate each cold-formed steel framing assembly to MAX out-of-square tolerance of 1/8 IN.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.02 INSTALLATION, GENERAL
- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
  - B. Install structural metal stud framing at all metal stud exterior walls.
  - C. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
  - D. Install cold-formed steel framing in accordance with ASTM C1007, AISI S200 and manufacturer's written instructions unless more stringent requirements are indicated.
  - E. Install cold-formed steel 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 steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
  - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
  - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- F. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- G. Install temporary bracing and supports to secure framing and support loads equal 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.
- H. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- I. Install insulation, specified in Section 07 21 00 Thermal Insulation, in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- J. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

### 3.03 ERECTION TOLERANCES

Install cold-formed steel framing level, plumb, and true to line to MAX allowable tolerance variation of 1/8 IN in 10 FT and as follows:

1. Space individual framing members no more than plus or minus 1/8 IN from plan location. Cumulative error shall not exceed MIN fastening requirements of sheathing or other finishing materials.

### 3.04 REPAIRS AND PROTECTION

- A. Galvanizing repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M 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 steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

**05 50 00**  
**METAL FABRICATIONS**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide miscellaneous metal work shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
- 1.03 REFERENCES
  - A. ASTM A36: Standard Specification for Carbon Structural Steel.
  - B. ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - C. ASTM A283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
  - D. ASTM A307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - E. ASTM A325: Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
  - F. ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - G. ASTM A501: Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
  - H. ASTM A575: Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
  - I. ASTM A663: Standard Specification for Steel Bars, Carbon, Merchant Quality, Mechanical Properties.
  - J. ASTM C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- 1.04 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
  - B. Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the AWS.
  - C. Fabrication of the work of this Section shall be in strict accordance with pertinent recommendations of the AISC.
- 1.05 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
- 1.06 PROJECT CONDITIONS
  - A. Field measurements: Check actual locations of walls, columns and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.
    - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

## 2.0 PRODUCTS

### 2.01 MATERIALS

- A. General:
  - 1. In fabricating items which will be exposed to view, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, and roughness.
  - 2. Except as otherwise shown on the Drawings, directed by the Architect, or required by governmental agencies having jurisdiction, provide materials as required for the Work and complying with the following minimum standards.
- B. Steel sections: Comply with ASTM A36.
- C. Plates: Comply with ASTM A283.
- D. Steel pipe: Comply with ASTM A501.
- E. Steel tube: Comply with ASTM A500, Grade B.
- F. Steel bars and bar-size shapes:
  - 1. For hot-rolled carbon steel bars and bar size shapes, comply with ASTM A575 in grade as selected by the fabricator.
  - 2. For other steel bars and bar-size shapes, comply with ASTM A663 or ASTM A36.
- G. Miscellaneous steel shapes: Provide bent or otherwise custom fabricated angles, channels, plates, tubes, anchors, hangers, dowels, bolts and connections where detailed or required, complying with ASTM A36.
- H. Security wire mesh: Welded wire square mesh, galvanized after welding, 16 gage wire in 1/2 IN x 1/2 IN square pattern, 48 IN wide rolls or sheets as distributed by McNichols Company or Louis E. Page, Inc.
- I. Anchor bolts: Comply with ASTM A307, non-headed type with heavy hexagonal nuts unless otherwise indicated.
- J. Unfinished threaded fasteners:
  - 1. Comply with ASTM A307, grade A, regular low carbon steel bolts and nuts.
  - 2. Provide either hexagonal or square heads and nuts; except use only hexagonal units for exposed connections.
- K. High strength threaded fasteners: Provide heavy hexagonal structural bolts, heavy hexagonal nuts, and hardened washers, all from quenched and tempered medium carbon steel complying with ASTM A325, ASTM A153 for galvanized components.

### 2.02 OTHER MATERIALS

- A. Shop primer: Use 10-99 Tnemec Primer or equal product of other manufacturers approved in advance by the Architect.
- B. Electrodes for welding: Select in accordance with AWS specifications for the metal alloy to be welded.
- C. Grout: Provide non-shrink non-metallic grout complying with ASTM C1107 equal to Master Builders "Masterflow 713".
- D. Fasteners: Provide bolts and nuts, lag or toggle bolts, machine or wood screws, plain or lock washers, and drilled expansion anchors as indicated or as appropriate.
- E. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### 2.03 FABRICATION-GENERAL

- A. Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability in the work of this Section. 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. Fit and shop assemble components in largest practical sections, for delivery to site, and in strict accordance with the approved Shop Drawings and pertinent requirements of governmental agencies having jurisdiction.
- C. Fabricate components with joints tightly fitted and secured.
- D. Continuously seal joined pieces by continuous welds.

- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
- F. Ease exposed edges to small uniform radius.
- G. Exposed mechanical flashings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- H. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- I. Fabricate components accurately for anchorage to each other and to building structure.
- J. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Remove burrs.
- K. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- L. Fabricate rough hardware to sizes, shapes, and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

#### 2.04 PEDESTRIAN CONTROL QUEUING RAILINGS

- A. Pedestrian control queuing railings: 2 IN x 2 IN steel tubes x thickness required by rail span, in compliance with ANSI A14.3; prime paint finish. Fabricate to comply with requirements shown for design, dimensions, member sizes, spacing, details and anchorages.
  - 1. Interconnect horizontal and vertical members by butt-welding or welding with internal connectors, at fabricator's option, except at L-intersections which shall be mitered and welded.

#### 2.05 FINISHES-STEEL

- A. Exterior steel components and steel components in exterior walls: Galvanized.
- B. Prime paint all interior steel items:
  - 1. Exception: Galvanize items to be embedded in concrete or masonry.
  - 2. Exception: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with spray fireproofing.
- C. Prepare surfaces to be primed in accordance with Steel Structures Painting Council SP-3, "Power Tool Cleaning".
- D. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- E. Prime painting: One (1) coat, 2.0 dry film thickness minimum.
  - 1. Exception: On surfaces inaccessible after assembly or erection, apply two (2) coats of primer.
- F. Galvanizing of structural steel members: Galvanize after fabrication to ASTM A123. Provide minimum 1.3 OZ/SF galvanized coating.
- G. Galvanizing of non-structural items: Galvanize after fabrication to ASTM A123. Provide minimum 1.3 OZ/SF galvanized coating.

#### 2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 IN maximum difference in diagonal measure.
- B. Maximum offset between faces: 1/16 IN.
- C. Maximum misalignment of adjacent members: 1/16 IN.
- D. Maximum bow: 1/8 IN in 48 IN.
- E. Maximum deviation from plane: 1/16 IN in 48 IN.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- 3.02 PREPARATION
- A. Clean and strip primed steel items to bare metal where site welding is required.
- 3.03 COORDINATION
- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
1. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions 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. Coordinate delivery of such items to Project site.
2. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.
- 3.04 INSTALLATION-GENERAL
- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field weld components indicated on Shop Drawings. Perform field welding in accordance with AWS D1.1.
- E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- G. Obtain approval prior to site cutting or creating adjustments not scheduled.
- H. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- 3.05 INSTALLATION-PEDESTRIAN CONTROL QUEUING RAILINGS
- A. Core concrete slab 4 IN deep MIN x 3 IN DIA MIN, set tube post in hole, and fill annular space between post and concrete slab solid with non-shrink grout.
- 3.06 ERECTION TOLERANCES
- A. Maximum variation from plumb: 1/4 IN per story, non-cumulative.
- B. Maximum offset from true alignment: 1/4 IN.
- C. Maximum out-of-position: 1/4 IN.

END OF SECTION

**06 10 00**  
**ROUGH CARPENTRY**

1.0 GENERAL

1.01 SUMMARY

- A. Provide lumber, plywood, fasteners and anchors, wood treatment, blocking, nailers, furring strips and other items needed, and perform rough carpentry for the construction shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 06 20 00: Finish Carpentry.

1.02 REFERENCES

- A. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. AWPA C2: Preservative Treatment by Pressure Processes; Lumber, timber, bridge ties and mine ties.
- C. AWPA C20: Fire Retardant Treatment by Pressure Processes; Structural lumber.
- D. NIST PS-1: Construction and Industrial Plywood.
- E. NIST PS-20: American Softwood Lumber Standard.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Lumber: Comply with NIST PS-20 and approved grading rules and inspection agencies.
  - 1. Acceptable lumber inspection agencies: Any agency with rules approved by American Lumber Standards Committee.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Protection:
  - 1. Deliver materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
  - 2. Identify framing lumber as to grades and store each grade separately from other grades.
  - 3. Do not store seasoned or treated materials in damp location.
  - 4. Protect edges of panel materials from damage to corners.
  - 5. Protect metals with adequate waterproof outer wrapping.
  - 6. Use extreme care in off loading of lumber to prevent damage, splitting and breaking of materials.

2.0 PRODUCTS

2.01 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on the Drawings, S4S.
- B. Moisture content: S-dry or MC19.
- C. Miscellaneous blocking, furring and nailers:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

2.02 CONSTRUCTION PANELS

- A. Plywood wall sheathing: NIST PS-1, Grade C-D, Exposure I.
- B. Miscellaneous panels:
  - 1. Concealed plywood: NIST PS-1, C-C plugged, exterior grade.
  - 2. Exposed plywood: NIST PS-1, A-D, interior grade.
  - 3. Electrical component mounting: APA rated sheathing, fire retardant treated.

## 2.03 FACTORY WOOD TREATMENT

- A. Fire retardant treatment: AWPA Treatment C20, Interior Type A Low Temperature (low hygroscopic), chemical treatment pressure impregnated; capable of providing a maximum flame spread/smoke developed rating of 25/450.
  - 1. Non-combustible wood shall be used in all locations required by codes and local authorities having jurisdiction, whether or not it is shown on the Drawings.
- B. Pressure treatment of lumber above grade: AWPA Treatment C2 using water-borne preservative to 0.25 LB/CF retention.
  - 1. Kiln dry after treatment to moisture content of 19% MAX.
  - 2. Treat wood in contact with roofing, flashing or waterproofing.
  - 3. Treat wood in contact with masonry or concrete.
  - 4. Treat wood less than 18 IN above grade.

## 2.04 ACCESSORIES

- A. Provide rough hardware and miscellaneous anchors, inserts, nails, bolts, screws, and other fastening devices of type, size and spacing required and in quantities needed for the Work shown on the Drawings.
- B. Fasteners and anchors:
  - 1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Drywall screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing
  - 3. Anchors: type best suited for project conditions.
- C. Backer plates:
  - 1. Type: 14 gage uncoated metal thickness steel sheet, galvanized in accordance with ASTM A653 G60.
  - 2. Length: Sufficient to extend to nearest studs beyond maximum dimension of attached item and engage fasteners from attached item; span 3 studs minimum.
  - 3. Height: 6 IN minimum or higher where required to accommodate item being fastened.
  - 4. When manufacturer of attached item has ore rigorous mounting plate requirements, comply with manufacturer's requirements.

## 2.05 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 DELIVERIES

- A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this Work.

### 3.03 COMPLIANCE

- A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.
- B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

### 3.04 WORKMANSHIP

- A. Produce joints which are tight, true and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.
- B. Selection of lumber pieces:
  - 1. Carefully select the members.



2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing and will allow making of proper connections.
  3. Cut out and discard defects which render a piece unable to serve its intended function.
  4. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
- C. Do not shim any framing component.
- 3.05 PREPARATION
- A. Items which require backer plates or blocking:
    1. Coordinate sizes and locations.
    2. Install additional studs for attachment of backer plates and blocking in required locations to receive surface mounted accessories as indicated or as required by accessory manufacturer.
    3. Elimination of backer plates and blocking is not permitted.
    4. Direct attachment of items to studs is not permitted.
  - B. Blocking and backer plates:
    1. Provide concealed wood blocking or metal backer plates for securing wood trim, carpentry, woodwork, cabinets, millwork, casework, surface mounted equipment, surface mounted fittings, fixtures, accessories, and furnishings, including, but not limited to handrails, grab bars, toilet partitions, towel bars, wall mounted door stops, and similar screw- and bolt-fastened items.
- 3.06 BLOCKING
- A. Install blocking as required to support items of finish and to cut off concealed draft openings, both vertical and horizontal.
- 3.07 ALIGNMENT
- A. On framing members to receive a finished surface, align the finish subsurface to vary not more than 1/8 IN from the plane of surfaces of adjacent furring and framing members.
- 3.08 INSTALLATION OF BACKING PANELS
- A. Placement:
    1. Place plywood with face grain perpendicular to supports and continuously over at least two supports.
    2. Center joints accurately over supports.
    3. Leave 1/16 IN space at end joints and 1/8 IN space at edge joints. Fasten at 6 IN OC at panel edges and at 10 IN OC at intermediate supports with screws.
  - B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.
- 3.09 FASTENING
- A. General:
    1. Install nails, bolts, metal connectors, powder-actuated fasteners, drive studs and miscellaneous anchors as required to properly fasten and support the work by recognized standards.
  - B. Nailing:
    1. Nails or spikes shall penetrate into the piece receiving the point not less than 1/2 the length of the nail or spike.
    2. Nail without splitting wood.
    3. Prebore as required.
    4. Remove split members and replace with members complying with the specified requirements.
  - C. Bolting:
    1. Drill holes 1/16 IN larger in diameter than the bolts being used.
    2. Drill straight and true from one side only.
    3. Do not bear bolt heads directly on wood but use washers under head and nut where both bear on wood, and use washers under all nuts.

- D. Screws:
  - 1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.
- E. Powder-actuated fasteners:
  - 1. Install fasteners in accordance with manufacturer's recommendations, with minimum embed length as recommended by manufacturer, for each type of installation.

3.10 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

END OF SECTION

**06 20 00**  
**FINISH CARPENTRY**

1.0 GENERAL

1.01 SUMMARY

- A. Provide wood, nails, screws and other items as needed, and perform finish carpentry for the construction shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 06 10 00: Rough Carpentry.
  - 2. Section 06 40 00: Architectural Woodwork.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit samples of solid wood trim 6 IN long for approval by the Architect.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Standards:
  - 1. Softwood plywood shall meet requirements of Product Standard PS-1-66.
  - 2. Hardwood plywood shall meet requirements of Product Standard PS-51-71.
  - 3. Board lumber shall meet requirements of the American Lumber Standards.
  - 4. Grades shall conform to the applicable sections of the Architectural Woodwork Institute Quality Standards.
- C. Wood grading:
  - 1. Finish Lumber shall be dressed free of tool marks and other objectionable defects.
  - 2. Finish Lumber shall be kiln-dried or otherwise seasoned to a moisture content not to exceed 6% at time of installation.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver the materials to the job site and store, in a safe area, protected from moisture, out of the way of traffic, and shored up off the ground surface.

2.0 PRODUCTS

2.01 GRADE STAMPS

- A. Identify plywood as to species, grade and glue type by the grade stamp of the association controlling the quality of the plywood.
- B. Identify board lumber by the grade stamp of the grading association authorized to grade the species.

2.02 MATERIALS

- A. Hardwood lumber for transparent finish: Red Oak, maximum moisture content of 6%; with rotary cut grain of quality suitable for transparent finish.
- B. Fasteners: Size and type to suit application.
- C. Accessories:
  - 1. Lumber for shimming and blocking: Softwood lumber of any species.
  - 2. Wood filler: Solvent base, tinted to match surface finish color.

2.03 FABRICATION

- A. Quality: AWI Section 300, Custom Grade.
- B. Profiles: As indicated on the Drawings or similar manufacturer's standard shapes.
- C. Kerf backs of solid stock trim members.

- D. Provide trim for scribing and site cutting.
- E. Rout members to shapes indicated on the Drawings.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 WORKMANSHIP

- A. Produce joints which are true, tight, and well nailed with all members assembled in accordance with the Drawings.
- B. Jointings:
  - 1. Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints.
  - 2. Install trim in pieces as long as possible, jointing only where solid support is obtained.
- C. Fastenings:
  - 1. Install items straight, true, level, plumb and firmly anchored in place.
  - 2. Carefully scribe work abutting other components, with maximum gaps of 1/32 IN. Do not use additional overlay trim to conceal larger gaps.
  - 3. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
  - 4. Nail trim with finish nails of proper dimension to hold the member firmly in place without splitting the wood.
  - 5. Nail exterior trim with galvanized nails, making joints to exclude water and setting in waterproof glue or sealant.
  - 6. On exposed work, set nails for putty.
  - 7. Screw, do not drive, wood screws; except that screws may be started by driving and then screwed home.

#### 3.03 INSTALLATION OF OTHER ITEMS

- A. Install items in strict accordance with the Drawings and the recommended methods of the manufacturer as approved by the Architect, anchoring firmly into position at the prescribed locations, straight, plumb and level.

#### 3.04 FINISHING

- A. Sand finished wood surfaces thoroughly as required to produce a uniformly smooth surface, always sanding in the direction of the grain. No course grained sandpaper mark, hammer mark or other imperfection will be accepted.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of type recommended for applied finishes.
- D. Finish work in accordance with ASI Architectural Woodwork Quality Standards Illustrated, Section 1500, System TR-3 (transparent).

#### 3.05 CLEANING UP

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the Work, free from accumulation of sawdust, cut-ends and debris.

END OF SECTION

**06 40 00**  
**ARCHITECTURAL WOODWORK**

1.0 GENERAL

1.01 SUMMARY

- A. Provide plastic laminate clad architectural woodwork where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 06 10 00: Rough Carpentry; Wood blocking or grounds inside finished walls or above finished ceilings.
  - 2. Section 06 61 16: Solid Surfacing Fabrications; Countertops and splashes.

1.02 DEFINITIONS

- A. Exposed surfaces:
  - 1. All surfaces visible when doors and drawers are closed.
  - 2. Door and drawer fronts and their edges.
  - 3. Exposed ends.
  - 4. Countertop and backsplash and their exposed edges.
  - 5. Face frames.
  - 6. Interior of open cabinets.
  - 7. Wall mounted adjustable shelves.
  - 8. Bottoms of cabinets 42 IN or more A.F.F.
  - 9. Tops of cabinets 78 IN or less A.F.F.
- B. Semi-exposed surfaces:
  - 1. Surfaces which become visible when doors are open or drawers are extended.
  - 2. Bottoms of cabinets more than 30 IN and less than 42 IN A.F.F.
- C. Concealed surfaces:
  - 1. Surfaces not visible after installation.
  - 2. Bottoms of cabinets less than 30 IN A.F.F.
  - 3. Tops of cabinets more than 78 IN A.F.F. and not visible from an upper level.
  - 4. Stretchers, blocking, and components concealed by drawers.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer' specifications and other data needed to prove compliance with the specified requirements for hardware, accessories and wood veneers.
  - 2. Shop Drawings, including dimensioned plans and elevations, and large scale details in sufficient detail to show materials, fabrication, installation, anchorage, accessory listings, hardware location, and interface of the work of this Section with the work of adjacent trades.
  - 3. Samples of plastic laminate for approval and color selection by the Architect.
  - 4. Samples of laminate clad panel products, 6 x 6 IN, for each type of surface finish.

1.04 REFERENCES

- A. ANSI A208.2: Medium Density Fiberboard (MDF) for Interior Applications.
- B. AWI P-200: Architectural Woodwork Quality Standards Illustrated.
- C. BHMA A156.9: American National Standard for Cabinet Hardware.
- D. NEMA LD3: High-Pressure Decorative Laminates.
- E. NHLA G101: Rules for the Measurement & Inspection of Hardwood & Cypress.
- F. NIST PS-1: Construction and Industrial Plywood.
- G. NIST PS-20: American Softwood Lumber Standard.

1.05 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

- B. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom quality unless noted otherwise.
  - C. Fabricator/Installer qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years of documented experience.
- 1.06 DELIVERY, STORAGE AND HANDLING
- A. Comply with pertinent provisions of Section 01 60 00.
  - B. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
  - C. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in paragraph 1.07 below.
- 1.07 PROJECT CONDITIONS
- A. Environmental conditions: Obtain and comply with woodwork manufacturer's and installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and can be maintained from date of installation through remainder of construction period.
  - B. Field measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final Shop Drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.
- 2.0 PRODUCTS
- 2.01 WOOD MATERIALS
- A. Softwood lumber: NIST PS-20; Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6%.
    - 1. For use in concealed locations.
  - B. Hardwood lumber: NHLA graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium; average moisture content of 6%.
    - 1. For use as exposed trim.
    - 2. Species and cut: Red Oak, rotary cut.
- 2.02 PANEL MATERIALS
- A. Hardwood plywood: NIST PS-1; graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, core materials of veneer, non-telegraphing grain, type of glue recommended for application.
  - B. Medium density fiberboard (MDF): Type as specified in AWI Architectural Woodwork Quality Standards Illustrated, composed of wood particles reduced to fibers in a moderate pressure steam vessel, combined with resin, and bonded together under heat and pressure, made with no added urea formaldehyde.
    - 1. At damp or wet areas, provide MDF with water-resistant core meeting requirements of ANSI A208.2 Grade 155 MR-50.
- 2.03 LAMINATE MATERIALS
- A. Manufacturers: Nevamar, WilsonArt, Formica or Pionite Plastic.
  - B. Plastic laminate: NEMA LD3, HGP, colors as scheduled.
    - 1. All exposed surfaces: General purpose grade, 0.050 IN thick.
    - 2. All semi-exposed surfaces: Low pressure melamine.
    - 3. Backing sheet: Grade BK20, 0.02 IN thick.
  - C. Edgeband:
    - 1. 3 MM PVC to match plastic laminate at doors, drawer fronts and false fronts.
    - 2. 0.5 MM PVC to match plastic laminate at case bodies.
  - D. Color selection:
    - 1. Wilsonart Slate Gray in all Restrooms to match PLAM on 2<sup>nd</sup> floor.
    - 2. Other locations not listed above, as selected by Architect.

## 2.04 ACCESSORIES

- A. Adhesive: Waterproof, Type I, CS-35.
- B. Fasteners: Size and type to suit application.
- C. Wire management grommets: Doug Mockett & Company #SG5 Round Grommet for 1-3/4 IN holes, #XG5 Round Grommet for 3 IN holes.
- D. Sealant: As specified in Section 07 92 00.

## 2.05 HARDWARE

- A. Rough hardware: Type and size as required by conditions of use.
- B. Finish hardware: As scheduled below, with BHMA 626, US26D, satin chromium plated or similar finish.
  - 1. Concealed cabinet door hinges: Blum or Grass 3000 series, three-dimensional adjustment, 110° MIN opening.
    - a. Provide 2 hinges for doors up to 48 IN high.
    - b. Provide 3 hinges for doors up to 60 IN high.
    - c. Provide 4 hinges for doors over 60 IN high.
  - 2. Door and drawer pulls: Stanley #348315 x 4 IN long cabinet pull. Provide 1 pull per door and drawer.
  - 3. Magnetic catches: Stanley #710300 aluminum, adjustable magnetic catch. Provide 1 catch per door.
  - 4. Keyboard and mouse tray: Knape & Vogt #5710, height adjustable, 75 LB load rating. Provide 1 set per tray.
  - 5. Drawer slides: Knape & Vogt #1300 3/4 extension roller slide. Provide 1 set per drawer.
  - 6. File drawer guides: Knape & Vogt #8405 box/file drawer guide with 1 IN overtravel, 100 LB load rating. Provide 1 set per drawer.
  - 7. Shelf supports: Knape & Vogt #331 flat shelf support with 1/4 IN DIA pin. Provide 4 pins for each shelf.
  - 8. Cable grommets: Doug Mockett & Company #BG5 for 1-1/2 IN holes, #XG5 for 3 IN holes.

## 2.06 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 2.07 FABRICATION

- A. Shop assemble woodwork for deliver to site to the maximum extent practical for handling and to permit passage through building openings.
- B. All work shall be rabbeted, doweled, tongue and grooved, glued and fastened in a substantial manner.
- C. When necessary to cut and fit on site, provide ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Fixed shelving shall be mortised into end supports.
- E. Provide cut-outs for plumbing fixtures, appliances, inserts, outlet boxes, and fixtures and fittings. Locate cutouts accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with a water-resistant coating.
- F. Door and drawer fronts shall be 3/4 IN thick, overlay style.
- G. Plastic laminate clad woodwork:
  - 1. Quality standards: AWI Section 400, Custom Grade.
  - 2. Construction: Frameless.
  - 3. Cabinet and door interface style: Flush overlay.
  - 4. Exposed interior and exterior surfaces: Plastic laminate.
  - 5. Semi-exposed surfaces: Melamine.
  - 6. Apply plastic laminate in full uninterrupted sheets; fit corners and joints to hairline. Slightly bevel arises. Apply laminate backing sheet to reversed side of laminate faced and veneer surfaces.
  - 7. Fit edges with matching PVC edging.

8. Drawers:
  - a. Sides: Solid hardwood.
  - b. Bottoms: MDF with melamine surfacing. Bottoms shall be fully housed into drawer sides.
  - c. Joinery: Dovetails or dowels.
9. Plastic laminates shall be bonded to core material with adhesive in accordance with manufacturer's recommendations. The temperature of the materials and the area in which the fabrication is to be done shall not be less than 65°F with a relative humidity of not less than 35% and not more than 80%.
10. Joints in plastic laminates shall be held to absolute minimum.
11. Backsplash detail: Butt joint.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify adequacy of backing and support framing.
- C. Verify location and sizes of utility rough-in associated with work of this Section.

#### 3.02 INSTALLATION

- A. Install the work of this Section in strict accordance with the approved Shop Drawings, the referenced standards and AWI Custom grade.
- B. Install architectural woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 IN in 8 FT for plumb and level (including tops) and with no variation in flushness of adjoining surfaces.
- C. Scribe and cut woodwork to fit adjoining work with maximum gaps of 1/32 IN and refinish cut surfaces or repair damaged finish at cuts. Do not use additional overlay trim for this purpose.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with fasteners and blind nailing as required for a complete installation.
- E. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- F. Install woodwork without distortion so that doors and drawers fit openings properly and are accurately aligned. Complete the installation of hardware and accessory items as indicated.
- G. Anchor countertops securely to base units and other support systems as indicated.

#### 3.03 ADJUSTING

- A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
- C. Lubricate and adjust hardware to function smoothly and correctly.

#### 3.04 CLEANING

- A. Clean woodwork, counters, shelves, hardware, fittings and fixtures.
- B. Touch-up shop-applied finishes to restore damaged or soiled areas.

#### 3.05 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures that woodwork will be protected from damage and deterioration until acceptance of Project.

END OF SECTION



**06 61 16**  
**SOLID SURFACING FABRICATIONS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide solid surface countertops and splashes where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 06 40 00: Architectural Woodwork.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Manufacturer's data sheets on each product to be used including:
    - a. Preparation instruction and recommendations.
    - b. Storage and handling requirements and recommendations.
    - c. Installation instructions.
    - d. Care and maintenance data, including repair and cleaning instructions.
  - 3. Shop drawings:
    - a. Include installation details of location and layout of each type of fabrication and accessory. Include countertop layout, dimensions, materials, finishes, cutouts, and attachments.
      - 1) Show seams, termination points, and details of edges.
      - 2) Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
  - 4. Samples, 2 x 2 IN MIN size, indicating full range of colors and patterns available from the proposed manufacturers for each finish product specified.

1.03 REFERENCES

- A. ASTM C501: Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
- B. ASTM D256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
- C. ASTM D570: Standard Test Method for Water Absorption of Plastics.
- D. ASTM D638: Standard Test Method for Tensile Properties of Plastics.
- E. ASTM D696: Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.
- F. ASTM D2583: Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- G. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. ASTM F462: Standard Consumer Safety Specification for Slip-Resistant Bathing Facilities.
- I. IAPMO/ANSI Standard Z124.1.2: Plastic Bathtub and Shower Units.
- J. NEMA LD.3: National Electrical Manufacturers Association, High Pressure Decorative Laminates.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

- B. Fire test response characteristics:
  - 1. Provide with the following Class A surface burning characteristics as determined by testing identical products per ASTM E84 or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. Flame spread of 25 or less.
    - b. Smoke developed of 450 or less.
- C. Fabricator qualifications: Manufacturer certified solid surface fabricator/installer with 2 YRS MIN documented experience in work of this Section.
- D. Installer qualifications: Firm with 2 YRS MIN documented experience in installation of systems similar in complexity to those required for this project, and acceptable to or licensed by manufacturer.
  - 1. Submit a signed copy of the installer's certificate, acknowledging the employee has been trained and approved by manufacturer.
- E. Source limitations: Obtain materials and products from single source

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver no components to project site until areas are ready for installation.
- C. Deliver sheets, fabricated items, materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Ensure that products of this Section are supplied to affected trades in time to prevent interruption of construction progress.
- D. Store solid surface products and accessories in manufacturer's unopened packaging indoors until ready for installation.
- E. Handle materials to prevent damage to finished surfaces.
  - 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.
- F. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Maintain relative humidity planned for building occupants and an ambient temperature between 65°F and 75°F for 48 HRS prior to and during installation. After installation, maintain relative humidity and ambient temperature planned for building occupants.

#### 1.07 WARRANTY

- A. Provide manufacturer's 10 year warranty against defective material and workmanship.
  - 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.

### 2.0 PRODUCTS

#### 2.01 MANUFACTURER

- A. Acceptable manufacturer: Aristech Surfaces LLC, 7350 Empire Drive, Florence, KY 41042, Tel. 800-354-9858, Web [www.aristechsurfaces.com](http://www.aristechsurfaces.com).
- B. Subject to compliance with requirements in this Section, products by one of the following manufacturers may be submitted for approval in accordance with Section 01 62 00:
  - 1. The Swan Company (Swanstone).
  - 2. DuPont (Corian).
  - 3. Formica Corporation (Formica Solid Surfacing, formerly Surell)
  - 4. Wilsonart (Wilsonart Solid Surface).
  - 5. Nevamar (HI-MACS).
  - 6. Gemstone (Gemstone Solid Surface).

## 2.02 SOLID SURFACE MATERIAL

- A. Basis of design: Avonite 100% acrylic solid surface as manufactured by Aristech Surfaces LLC.
- B. Description: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, ATH (alumina tri-hydrate) filler and pigment.
- C. Color selection:
  - 1. As selected by the Architect from the standard colors of the approved manufacturer to match Corian, Sahara to match solid surface material on 2<sup>nd</sup> floor.
- D. Finish:
  - 1. Provide surfaces with a uniform Matte or Satin finish as selected by the Architect.
- E. Performance characteristics (based on 1/2 IN thickness):
  - 1. Flame spread index: Class A when tested in accordance with ASTM E84.
  - 2. Specific gravity: 27.7 GR/CI.
  - 3. Hardness: 60, when tested in accordance with ASTM D2583.
  - 4. Elongation: 2.2%, when tested in accordance with ASTM D638.
  - 5. Tensile strength: 4,200 PSI, when tested in accordance with ASTM D638.
  - 6. Tensile modulus:  $11 \times 10^5$ , when tested in accordance with ASTM D638.
  - 7. Water absorption after 24 HRS: 0.07%, when tested in accordance with ASTM D570.
  - 8. Izod impact foot pounds per IN: 0.03, when tested in accordance with ASTM D256.
  - 9. Impact resistance 1/2 LB: No Fracture, when tested in accordance with NEMA LD3-3.3.
  - 10. Linear thermal expansion:  $2.0 \times 10^{-5}$ , when tested in accordance with ASTM D 696.
  - 11. High temperature resistance: Slight Effect, when tested in accordance with NEMA LD3-3.6.
  - 12. Boiling water resistance: No effect, when tested in accordance with NEMA LD3-3.5.
  - 13. Stain resistance: No effect, when tested in accordance with NEMA LD3-3.9.
  - 14. Weight per SF (1/4 IN thickness): 4.4 LBS.

## 2.03 ACCESSORIES

- A. Joint adhesive:
  - 1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, non-porous joints.
- B. Sealant:
  - 1. Manufacturer's standard mildew-resistant, FDA compliant, UL listed, silicone sealant in color to match solid surface components.

## 2.04 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 2.05 FABRICATION

- A. Solid surface shall be factory fabricated by an authorized fabricator.
- B. Fabricate countertops and splash of 3/4 IN thick material unless otherwise indicated.
- C. Solid surface shall be fabricated to field measurements.
- D. Cut and finish component edges with clean, sharp returns.
- E. Finished edges shall have a 1/16 IN radius.
- F. Cutouts for accessories shall be smooth and uniform without saw marks. The top and bottom of openings shall be finished smooth.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
  - 1. Do not begin installation until substrates have been properly prepared.
  - 2. Examine substrates to receive countertops. Identify conditions detrimental to proper or timely installation. Do not commence installation until conditions have been corrected
  - 3. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.
  - 4. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.03 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position straight, plumb, level, and rigid, scribed to adjacent finishes, for long life under hard use.
- C. Install in accordance with manufacturer's instructions installation guidelines and recommendations.
- D. Install components plumb and level, in accordance with approved shop drawings, project installation details and manufacturer's printed instructions.
- E. Form joints using manufacturer's approved adhesive, with joints inconspicuous in finished work.
- F. Install shower pan plumb and level in accordance with manufacturer's instructions.
- G. Cure countertops for 24 HRS MIN before exposure to moisture or pressure.
- H. Corner joints: Form 1/8 IN-wide joints, sealed with manufacturer's color-matching silicone sealant.
- I. Field cut countertop as required for accessories.
- J. Provide backsplashes and end splashes as indicated on the Drawings. Adhere to countertops using manufacturer's recommended silicone sealant.
- K. Field joints shall be hard seamed unless otherwise specified.
- L. Attach solid surface material to leveled supports on frame with dabs of silicone every 18 to 24 IN.
- M. Fasten solid surface material to frame by anchoring screws to supports at all corner blocks. Screws should not come in contact with solid surface material, as this may cause cracking of countertop.
- N. Remove excessive adhesive and sealants. Components shall be clean on date of Substantial Completion.
- O. Coordinate plumbing installation with Division 22.

#### 3.04 CLEANING AND PROTECTION

- A. Keep solid surface components clean during installation.
- B. Remove adhesives, sealants and other stains.
- C. Protect installed solid surface components from damage. Repair or replace damaged work to Architect's satisfaction.

3.05 SCHEDULE OF COMPONENTS

- A. Model numbers listed below are based on Avonite products. Provide the components listed below or equal components of other approved manufacturers.
- B. Countertops:
  - 1. Size: Length as shown on the drawings x 24 IN deep x 3/4 IN thick.
- C. Edge thickness/treatment:
  - 1. 1-1/2 IN: Stacked edge buildup.
  - 2. Over 1-1/2 IN: Drop edge buildup.
- D. Back splash and end splash:
  - 1. 4 IN high x 3/4 IN thick.

END OF SECTION

**07 21 00**  
**THERMAL INSULATION**

1.0 GENERAL

1.01 SUMMARY

- A. Provide building insulation where shown on the Drawings, as specified herein and as needed for a complete and proper installation, including but not limited to:
  - 1. Thermal batt insulation in ceilings.
  - 2. Acoustic batt insulation in walls.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements, including installation and maintenance instructions.

1.03 REFERENCES

- A. ASTM E96: Standard Test Method for Water Vapor Transmission of Materials.
- B. ASTM C665: Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- C. ASTM C1338: Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- D. ASTM D2020: Standard Test Method for Mildew (Fungus) Resistance of Paper and Paperboard.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Applicator qualifications: Utilize a qualified applicator with demonstrated experience in performing work comparable to the work of this Section, and who is trained and authorized by the manufacturer to install the product.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery: Deliver materials to applicator/site in manufacturer's original, unopened, undamaged containers with identifications labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.06 PROJECT CONDITIONS

- A. Environmental conditions: Do not install insulation until all areas to receive insulation are substantially water and weather tight.
- B. Environmental conditions: Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.07 SEQUENCING

- A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this Section.

2.0 PRODUCTS

2.01 MATERIALS

- A. Provide the following building insulation where shown on the Drawings or otherwise needed to achieve the degree of insulation required under pertinent regulations of governmental agencies having jurisdiction.

1. Acoustic insulation in interior walls: Unfaced Formaldehyde-free fiberglass blankets 3-5/8 IN thick x 16 IN wide complying with ASTM C665, Type I, equal to Johns Manville Formaldehyde-Free Fiber Glass Sound Control Insulation.
2. Thermal insulation above ceilings: MR faced, mold and mildew resistant Formaldehyde-free fiberglass insulation batts 6-1/4 IN thick x 24 IN x 48 IN with R-19 thermal resistance value complying with ASTM C665, Type II, Class C, Category 1, permeability complying with ASTM E96, mold and mildew resistance complying with ASTM C1338 and D2020, equal to Johns Manville MR Faced Formaldehyde-Free Thermal and Acoustical Fiber Glass Insulation.

## 2.02 OTHER MATERIALS

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 IN wide.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Conditions for batt insulation:
  1. Verify that substrate, adjacent materials and insulation materials are dry and that substrates are ready to receive insulation.
  2. Verify substrate surfaces are flat and construction framing is free of irregularities or projections which may damage or prevent proper insulation.

### 3.02 INSTALLATION

- A. General:
  1. Install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
    - a. Install in wall or ceiling spaces without gaps or voids.
    - b. Do not compress insulation.
    - c. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
    - d. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
    - e. Lap ends and side flanges of insulation over framing members.
    - f. Tape seal butt ends, lapped flanges, and tears or cuts in vapor barrier.
    - g. Secure insulation as required to prevent displacement.
- B. Interior wall acoustic insulation:
  1. Install insulation in interior stud walls where shown on the Drawings, full height of walls.
- C. Ceiling thermal insulation:
  1. Install insulation on top of suspended ceilings where shown on the Drawings. Snugly butt side and end joints and extend across and up sides of furrings or partitions at different ceiling heights to form complete envelope protection. Turn MR face toward room side of ceilings.

### 3.03 CLEANING

- A. Properly and legally dispose of waste with other construction waste material.

### 3.04 PROTECTION

- A. Protect installed insulation and vapor retarders from damage from subsequent construction or harmful weather exposures.

END OF SECTION

**07 26 00**  
**VAPOR RETARDERS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide vapor retarders where shown on the Drawings, as specified herein and as needed for a complete and proper installation, including but not necessarily limited to replacing portions of the concrete slab removed for modifications to underfloor utilities.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.03 REFERENCES

- A. ASTM D882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- B. ASTM D1709: Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
- C. ASTM E154: Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- D. ASTM E1643: Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- E. ASTM E1745: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- F. ASTM F1249: Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Materials shall be identified on the package with manufacturer's name and type of material.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

2.0 PRODUCTS

2.01 VAPOR RETARDER

- A. Provide 15 MIL polyolefin membrane complying with ASTM E1745 Class A, equal to Yellow Guard Vapor Barrier as manufactured by Husky, distributed by Poly-America LP, Grand Prairie, TX, Tel. 800-527-3322, Web [www.yellowguard.com](http://www.yellowguard.com).
  - 1. Puncture resistance: >2200 grams in accordance with ASTM D1709.
  - 2. Water vapor permeance: <0.01 perms in accordance with ASTM F1249.
  - 3. Permeance after conditioning: <0.1 perms in accordance with ASTM E154/F1249.
  - 4. Tensile strength: >45.0 LBF/IN in accordance with ASTM D882.

2.02 OTHER MATERIALS

- A. Tape: Provide nominal 4 IN wide polyethylene film coated with high-tack pressure-sensitive rubber adhesive equal to Yellow Guard Red Tape as manufactured by Husky.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.



### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify items which pass through membrane are properly and rigidly installed.
- C. Verify subgrade is sufficiently smooth and free of projections and irregularities which may be detrimental to the proper installation of the membrane.

#### 3.02 INSTALLATION

- A. Install membrane under all concrete floor slabs on grade within the building area in accordance with ASTM E1643.
- B. Prior to placing slab reinforcing, cover entire area with one layer of membrane in accordance with manufacturer's recommendations, laid smooth without folds or bunches of material. Lay membrane in widest practical widths, with the long dimension parallel to the direction of the pour of the concrete.
  - 1. Lap all joints in membrane 6 IN MIN and seal with tape as recommended by membrane manufacturer. Membrane shall be as clean and dry as possible before sealing with tape.
  - 2. Carefully cut membrane around plumbing, electrical and similar penetrations and seal with penetration boot or tape as recommended by membrane manufacturer.
- C. Inspect and repair membrane prior to pouring concrete; tape tears, punctures and similar damage.

END OF SECTION

**07 84 00  
FIRESTOPPING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide firestopping where shown on the Drawings, as specified herein and as needed for a complete and proper installation including, but not necessarily limited to:
  - 1. Penetrations by mechanical and electrical systems, including ducts, piping, and conduit.
  - 2. Miscellaneous openings in fire assemblies.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings in sufficient detail to show systems, materials, installation methods, and interface of the work of this Section with the work of adjacent trades.
  - 3. Certification that the proposed materials are acceptable for the proposed use to the governmental agencies and insurance rating bureaus having jurisdiction.

1.03 REFERENCES

- A. ASTM E119: Standard Test Method for Fire Tests of Building Construction Materials.
- B. ASTM E814: Standard Test Method for Fire Tests of Penetration Firestop Systems.
- C. UL: Fire Resistance Directory; Underwriters Laboratories Inc.
- D. FM: Approval Guide; Factory Mutual Research Corporation.
- E. ITS: Directory of Listed Products; Intertek Testing Services NA, Inc.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Listing in the current classification or certification books of UL, FM or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
- C. Firestopping systems shall maintain required ratings of assemblies when tested in accordance with ASTM E119 and ASTM E814.
- D. Procedures and methods shall comply with requirements of the IBC, latest edition and with requirements of the Owner.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

1.06 PROJECT CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain MIN temperature before, during and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

2.0 PRODUCTS

2.01 MATERIALS

- A. Use any system listed by acceptable certification books or tested in accordance with ASTM E119 or ASTM E814 that has F Rating equal to fire rating of penetrated assembly and minimum T Rating equal to F Rating and that meets all other specified requirements.
- B. Provide any firestopping material meeting requirements including, but not limited to:
  - 1. Elastomeric silicone firestopping; Single component silicone-elastomeric compound and compatible silicone sealant.

2. Foam firestopping: Single component foam compound.
3. Fibered compound firestopping: formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber packing material: Mineral fiber packing insulation.
5. Firestop devices: Mechanical device with incombustible filler and sheet stainless steel jacket.
6. Intumescent putty: Compound which expands on exposure to surface heat gain.
7. Firestopping mortar.
8. Firestop pillows: Formed mineral fiber pillows.

## 2.02 OTHER MATERIALS

- A. Primers, sleeves, forms and accessories: Type required for tested assembly design.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify openings are ready to receive the work of this Section.

### 3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which may affect bond.
- C. Install backing and damming materials to arrest liquid material leakage.

### 3.03 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Apply the approved materials as needed to achieve the designated fire-resistivity, in strict accordance with the approved Shop Drawings, pertinent requirements of governmental agencies and insurance rating bureaus having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, completely closing the opening.

### 3.04 CLEANING AND PROTECTION

- A. Protect adjacent surfaces from damage by material installation.
- B. Clean adjacent surfaces of firestopping materials.

END OF SECTION

**07 92 00**  
**JOINT SEALANTS**

1.0 GENERAL

1.01 SUMMARY

- A. Throughout the Work, seal and caulk joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air, including but not necessarily limited to:
  - 1. Sealant at exterior and interior window, door and equipment openings.
  - 2. Sanitary sealant/caulk in perimeter joints of plumbing fixtures.
  - 3. Other locations indicated on Drawings or required to produce a watertight building.
- B. Related work:
  - 1. Section 08 71 00: Door Hardware: Threshold sealant.
  - 2. Section 08 81 00: Glass Glazing: Glazing compound/sealant.
  - 3. Section 09 29 00: Gypsum Board: Acoustical sealant.
  - 4. Section 09 30 13: Ceramic Tiling: Expansion joints.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view, for color selection by Architect.

1.03 REFERENCES

- A. ASTM C834: Standard Specification for Latex Sealants.
- B. ASTM C920: Standard Specification for Elastomeric Joint Sealants.
- C. ASTM C1193: Standard Guide for Use of Joint Sealants.
- D. ASTM C1382: Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems Joints.
- E. ASTM D1667: Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Materials shall be identified on the package with the manufacturer's name and type of material.
- C. Applicator qualifications: Firm experienced in performing the work of this Section with not less than three (3) years experience.

1.05 PROJECT CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

1.07 WARRANTY

- A. Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## 2.0 PRODUCTS

### 2.01 SEALANTS

- A. Provide one component polyurethane non-sag gun sealant complying with FS TT-S-00230C, Type II, Class A and ASTM C920, Type S, Grade NS, Class 25, equal to 'Dynatrol I-XL' as manufactured by Pecora Corporation, Dallas, Texas, Tel. 800-233-9754.
  - 1. Application:
    - a. Perimeter joints around exterior door and window frames.
- B. Provide one component, acrylic latex calk complying with ASTM C834, equal to 'AC-20' as manufactured by Pecora Corporation.
  - 1. Application:
    - a. Interior window, door and equipment openings.
    - b. Below metal stud track at interior sound insulated partitions.
- C. Provide one component mildew-resistant, sanitary silicone sealant complying with FS TT-S-00230C, Type II, Class A and ASTM C920, Class 25, equal to 'Pecora 898' as manufactured by Pecora Corporation.
  - 1. Application:
    - a. Perimeter joints of lavatories and toilets.
    - b. Other interior vertical and non-traffic horizontal joints in wet areas.
- D. Colors for each sealant installation will be selected by the Architect from standard colors normally available from the approved manufacturer.

### 2.02 OTHER MATERIALS

- A. Primer: Non-staining primers which have been tested for durability on the surfaces to be sealed and as recommended by sealant manufacturer to suit application.
- B. Joint backing: Round foam backer rod and backup materials compatible with sealant and oversized 30% to 50% larger than joint width, as recommended by sealant manufacturer to suit application, and complying with ASTM D1667.
- C. Bond-breaker tape: Pressure sensitive polyethylene tape or other plastic tape as recommended by sealant manufacturer. Provide self-adhesive tape where applicable.
- D. Masking tape: Non-staining, non-absorbent masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.
- E. Joint cleaner: Non-corrosive and non-staining type cleaner compatible with sealant and joint forming materials, and as recommended by sealant manufacturer.
- F. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify that substrate surfaces and joint openings are ready to receive work.
- C. Verify that joint backing and release tapes are compatible with sealant.

### 3.02 ENVIRONMENTAL CONDITIONS

- A. Do not apply sealant when temperature is below 40°F.
- B. Do not apply sealant when substrates are wet due to rain, frost, condensation, or other causes.

### 3.03 PREPARATION

- A. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- B. Remove all foreign material from joint substrate which could interfere with adhesion of joint sealer, including dust, paints (except for permanent protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealers, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

- C. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
- D. Remove laitance and form release agents from concrete.
- E. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- F. Prime joint substrates where recommended by sealant manufacturer for the particular installation, applying in strict accordance with the manufacturer's recommendations as approved by the Architect. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces. Do not prime backer-rod.
- G. Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears.

### 3.04 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions and ASTM C1193.
- B. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
  - 1. Keep face of sealant recessed 1/8 IN from surface of joint.
  - 2. Minimum joint size: 1/4 IN x 1/4 IN.
  - 3. Joints 1/4 IN to 1/2 IN wide: Depth equal to width.
  - 4. Joints over 1/2 IN wide: Depth equal to 1/2 width.
- C. Joint backing:
  - 1. When using backup of tube or rod stock, avoid lengthwise stretching of the material.
  - 2. Do not twist, braid, puncture, or tear joint fillers.
  - 3. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
  - 4. For installation of backup material, provide a blunt-surfaced tool of wood or plastic, having shoulders designed to ride on the adjacent finished surface and a protrusion of the required dimensions to assure uniform depth of backup material below the sealant.
  - 5. Do not, under any circumstance, use a screwdriver or similar tool for this purpose.
  - 6. Using the approved tool, smoothly and uniformly place the backup material to the depth indicated on the Drawings or otherwise required, compressing the backup material 25% to 50% and securing a positive fit.
- D. Bond-breaker tape: Install tape where adhesion of sealant to surfaces at back of joints would result in sealant failure and other locations where recommended by the manufacturer of the sealant, adhering strictly to the manufacturers' installation recommendations.
- E. Sealant:
  - 1. Apply sealant under pressure with power-actuated hand gun or manually-operated hand gun, or by other appropriate means.
  - 2. Use guns with nozzle of proper size and providing sufficient pressure to completely fill the joints as designed.
  - 3. Install sealant free of air pockets, foreign embedded matter, ridges and sags.
  - 4. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tooling:
  - 1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads with slightly concave surface, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint.

2. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 CLEANING

- A. Remove masking tape and protective coatings immediately after tooling joints without disturbing joint seal.
- B. Clean off excess sealants or sealant smears adjacent to joints as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.
- C. Upon completion of the work of this Section, promptly remove from the job site all debris, empty containers, and surplus material derived from this portion of the Work.

3.06 PROTECTION

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at the time of Substantial Completion.
- B. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joints sealer installation with repaired areas indistinguishable from original work.

END OF SECTION

**08 11 13**  
**HOLLOW METAL DOORS & FRAMES**

1.0 GENERAL

1.01 SUMMARY

- A. Provide hollow metal doors and frames where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 08 14 23: Plastic-Laminate-Faced Wood Doors.
  - 2. Section 08 41 13: Aluminum-Framed Entrances & Storefronts.
  - 3. Section 08 71 00: Door Hardware.
  - 4. Section 09 91 00: Painting; Field finishing of hollow metal doors and frames.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Shop Drawings showing details of each frame type, elevations of door design types, conditions at openings, and details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints, connections, installation, and anchorage.
  - 2. Schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.
  - 3. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.03 REFERENCES

- A. ANSI 250.8: SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
- B. ANSI 250.10: Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- C. DHI A115 Series: Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute.
- D. NAAMM HMMA 840: Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural metal Manufacturers.
- E. NFPA 80: Standard for Fire Doors and Fire Windows; National Fire Protection Association.
- F. NFPA 252: Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
- G. UL: Building Materials Directory; Underwriters Laboratories Inc.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Unless specifically otherwise approved by the Architect, provide all products of this Section from a single manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver hollow metal work cartoned or crated to provide protection during transit and site storage.
- C. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provide refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.



- D. Store doors and frames at site under cover and in accordance with NAAMM HMMA 840. Place units on minimum 4 IN high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper or door becomes wet, remove carton immediately. Provide 1/4 IN spaces between stacked doors to promote air circulation.

## 2.0 PRODUCTS

### 2.01 HOLLOW METAL DOORS

- A. Acceptable products:
  - 1. As manufactured by Amweld Building Products, Ceco Door Products, Curries Company or Steelcraft.
  - 2. Equal products of other manufacturers approved in advance by the Architect.
- B. Type and design:
  - 1. Grade: Comply with ANSI A250.8 Level 3.
  - 2. Provide hollow metal doors equal to Curries 707 T Series. Fabricate from two sheets of 18 gage steel bonded to polyurethane core. Reinforce edges of doors with not less than 14 gage channels. Skins shall be jointed at center of door edge with seam continuously welded and ground smooth. Exterior doors shall have top closure flush with top of faces and edges.
  - 3. Provide fire rated doors listed and labeled by UL for class of opening scheduled on the Drawings, with temperature and rise ratings as required by code and tested in accordance with NFPA 252.
- C. Finish: Pre-clean, phosphatize and shop prime each door suitable as a base for finish painting which will be performed at the job site under Section 09 91 00 of these Specifications.

### 2.02 HOLLOW METAL FRAMES

- A. Acceptable products: See Paragraph 1.04-B above.
- B. Type and design:
  - 1. Grade: Comply with ANSI A250.8 Level 3.
  - 2. Provide hollow metal frames in the dimensions and types shown on the Drawings, manufactured from 14 gage cold roll steel. Joints at header and jambs shall be mitered with integral tabs for reinforcement and secure locking. All joints shall be continuously arc welded and ground smooth. Provide removable spreader bars at bottom of frames.
  - 3. Provide fire rated frames listed and labeled by UL for class of opening scheduled on the Drawings, with temperature and rise ratings as required by code and tested in accordance with NFPA 252.
- C. Finish: Pre-clean, phosphatize and shop primed suitable as a base for finish painting which will be performed at the job site under Section 09 91 00 of these Specifications.

### 2.03 FINISH MATERIALS

- A. Primer: Door and frame manufacturer's standard rust-inhibiting primer, complying with ANSI 250.10.
- B. Bituminous coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

### 2.04 OTHER MATERIALS

- A. Anchors:
  - 1. Provide anchor at each jamb for each 30 IN of door height or fraction thereof.
  - 2. Use proper anchor types to provide positive fastenings to adjacent construction.
  - 3. Provide one (1) welded floor anchor at each jamb.
- B. Temporary frame spreader: Provide for all factory- or shop-assembled frames.
- C. Mortar guard boxes: Provide for hardware cutouts in frames to be installed in masonry or concrete walls or to be grouted.
- D. Grout: Portland cement grout of 4 IN MAX slump for hand troweling; thinner pumpable grout is prohibited.

- E. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 2.05 PREPARATION FOR FINISH HARDWARE
- A. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with DHI A115 Series, final Finish Hardware Schedule and templates provided by hardware supplier.
  - B. Reinforce, drill, and tap doors and frames to receive surface-applied hardware.
  - C. Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-leaf frames and 2 silencers on heads of double-leaf frames.
  - D. Inspect and field measure existing doors and finish hardware to be relocated and reused to ensure new frames are prepared accurately to receive existing doors and hardware.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
  - B. Verify that opening sizes and tolerances are acceptable.
- 3.02 PREPARATION
- A. Coat inside of frames to be installed in masonry or concrete walls or to be grouted, with bituminous coating, prior to installation.
- 3.03 INSTALLATION
- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
  - B. Install fire rated units in accordance with NFPA 80.
  - C. Coordinate frame anchor placement with wall construction.
  - D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
  - E. Coordinate installation of hardware.
  - F. Coordinate installation of glazing.
- 3.04 ERECTION TOLERANCES
- A. Clearances between door and frame: As specified in ANSI A250.8.
  - B. Maximum diagonal distortion: 1/16 IN measured with straight edge, corner to corner.
- 3.05 ADJUST AND CLEAN
- A. Final adjustments:
    - 1. Check and readjust operating finish hardware items in steel work just prior to final inspection.
    - 2. Leave work in complete and proper operating condition.
    - 3. Remove defective work and replace with work complying with the specified requirements.
  - B. Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

END OF SECTION

**08 12 15**  
**PREFINISHED STEEL DOOR FRAMES**

1.0 GENERAL

1.01 SUMMARY

- A. Provide prefinished steel door frames where shown on the Drawings, as specified herein and as needed for a complete and proper installation, including but not limited to:
  - 1. Knocked down, site assembled prefinished steel door frame at Door 50.
- B. Related work:
  - 1. Section 08 11 13: Hollow Metal Doors & Frames.
  - 2. Section 08 14 23: Plastic-Laminate-Faced Wood Doors.
  - 3. Section 08 41 13: Aluminum-Framed Entrances & Storefronts.
  - 4. Section 08 71 00: Door Hardware.
  - 5. Section 09 91 00: Painting; Field finishing of hollow metal doors and frames.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Product data: Indicate frame material, gage, configuration and finishes.
  - 2. Shop Drawings showing details of each frame type, elevations of door design types, conditions at openings, and details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints, connections, installation, and anchorage.
  - 3. Schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.
  - 4. Indicate coordination of glazing frames and stops with glass and glazing requirements.
  - 5. Manufacturer's installation instructions for all products under this Section.

1.03 REFERENCES

- A. ASTM A653: Standard for Hot Dipped Galvanized Steel Material.
- B. ASTM B117: Standard Test for Salt Spray Testing.
- C. ASTM D2197: Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.
- D. ASTM D2247: Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- E. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- F. ASTM D3361: Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- G. NFPA 80: Standard for Fire Doors and Fire Windows.
- H. NFPA 101: Life Safety Code.
- I. UBC 7-2-97, UBC 7-4-97 Positive Pressure Fire Test Certification.
- J. UL 10B: Fire Test of Door Assemblies.
- K. UL 10C: Standard for Positive Pressure Fire Tests of Door Assemblies.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use only installers familiar with installation of prefinished opening systems and applied casing frame installation.
- C. Quality standards:
  - 1. Material free from defects in material and according to project specifications for pre-engineered opening systems.
  - 2. Proven durability of factory finishes allowing for bending and shaping of material after finish is applied.

- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Comply with pertinent provisions of Section 01 60 00.
  - B. Transport, handle, store and protect products in a dry area off the ground.
  - C. Accept frames on site in manufacturer's box packaging with identification labels intact. Inspect for damage.
  - D. Do not open individual boxes until installation is to begin.
- 2.0 PRODUCTS
- 2.01 PREFINISHED STEEL DOOR FRAMES
- A. Acceptable products:
    1. As manufactured by Timely Industries, Pacoima, CA, Tel. 800-247-6242, Web [www.timelyframes.com](http://www.timelyframes.com).
    2. Equal products of other manufacturers approved in advance by the Architect.
  - B. Frame material: Hot dipped galvanized steel, for interior frames in normal atmospheric exposures.
  - C. Frame throat opening: 4-7/8 IN to 5 IN to suit existing finished wall thickness.
  - D. Frame profile: Unequal rabbet profile, standard with manufacturer, C Series, 18 gage thickness.
  - E. Casings:
    1. Provide steel or aluminum casings formed to be applied to heat treated clips on face frame after frame is anchored to wall.
    2. Standard steel – TA-8 with 1/4 IN reveal, on steel, stainless steel, and/or brass frames. Fit factory assembled units with MiterGard corner alignment clips.
- 2.02 FRAME REINFORCEMENT AND ACCESSORIES
- A. Provide reinforcements shipped loose to project site for hardware application.
  - B. Provide reinforcements and prepare frames for finish hardware specified in Section 08 71 00 Door Hardware.
- 2.03 FABRICATION
- A. Openings for single swing, pair, borrowed light and sidelight frames to be pre-cut, notched and fabricated at the manufacturer's facility. For fire rated and exterior openings, provide kerf at stop for installation of smoke gasket or weatherstrip.
  - B. Provide 14 Gage MIN hinge reinforcement plate tapped for machine screws supplied with hinges. Hinge plate to be mechanically attached to hinge emboss on frame.
  - C. Casing clips: Fabricate frames with factory applied, heat treated clips to ensure no deflection in the clip upon application or removal of casing. Attachment clips may not be of same material as frame.
  - D. Provide notches, tabs and/or stops for positive alignment of frame parts at all corners.
- 2.04 FINISHING
- A. Steel frame units: Prefinished with factory applied impact resistant, polyurethane baked enamel finish or optional electrostatic applied water based paint system
  - B. Steel casing finishes: Prefinished with factory applied impact resistant, polyurethane baked enamel finish.
  - C. Color: Custom matched for project requirements.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
  - B. Verify that opening sizes and wall thicknesses are within specified tolerances. Verify that all finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install frames in accordance with manufacturer's requirements.
- B. Anchor frames with screws located at every casing clip or every 11 IN as shown on manufacturer's instructions. Field verify quantity and location of fasteners prior to installing casing.
- C. Install prefinished frames near end of the project after wall painting and wall coverings are applied.
- D. Install frames using qualified installers familiar with installation of prefinished drywall frames.
- E. Coordinate installation of glass and glazing in glazed units.
- F. Coordinate installation of frames with installation of finish hardware specified in Section 08 71 00 and doors in Section 08 14 23.
- G. Touch-up blemishes on finished frames with factory prepared touch up paint.

END OF SECTION

**08 14 23**  
**PLASTIC LAMINATE FACED WOOD DOORS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide plastic laminate faced wood doors where shown on the Drawings, as specified herein and as needed for a complete and proper installation including.
- B. Related work:
  - 1. Section 08 81 00: Glass Glazing.
  - 2. Section 08 71 00: Door Hardware.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings in sufficient detail to show location, size and hand of each door, elevation of each kind of door, construction details not covered in Product Data, and the following:
    - a. Dimensions and locations of blocking.
    - b. Dimensions and locations of mortises and holes for hardware.
    - c. Dimensions and locations of cutouts.
    - d. Undercuts.
    - e. Requirements for veneer matching.
    - f. Doors to be factory finished and finish requirements.
    - g. Fire-protection ratings for fire-rated doors.
  - 3. Samples for initial selection: High pressure decorative laminate in the full range of colors available from the proposed manufacturer in the specified product for matching to existing doors.
  - 4. Samples for verification:
    - a. Factory finishes applied to actual door face materials, approximately 8 IN x 10 IN, for each material and finish.
    - b. Provide construction samples of doors, approximately 5 IN x 5 IN, with door faces and vertical edges representing actual construction to be used.
    - c. Louver blade and frame sections, MIN 6 IN long, for each material and finish specified.
    - d. Frames for light openings, MIN 6 IN long, for each material, type, and finish required.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Quality standard: Comply with WDMA I.S.1-A-11, Architectural Wood Flush Doors.
- C. Manufacturer qualifications:
  - 1. A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body when FSC Certified wood is specified.
  - 2. A qualified manufacturer that is a member in good standing of the Window and Door Manufacturers Association.
- D. Vendor qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body when FSC Certified wood is specified
- E. Product performance: Provide documents showing compliance to the following WDMA attributes, validating the specified WDMA Performance Duty Level:
  - 1. Adhesive bonding durability: WDMA TM-6.
  - 2. Cycle slam: WDMA TM-7.
  - 3. Hinge loading: WDMA TM-8.

4. Screw holding: WDMA TM-10.
  - a. Door face.
  - b. Vertical door edge.
  - c. Horizontal door edge (applies when hardware is attached).

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Package factory-finished doors individually in manufacturer's standard plastic bags, stretch wrap or cardboard cartons.
- C. Mark each door on top rail with opening number used on Shop Drawings. Include manufacturer's order number and date of manufacture.
- D. Deliver doors just prior to installation and store in conformance with manufacturer's recommendations.
- E. Do not drag doors across one another; lift doors and carry them into position.

#### 1.05 FIELD CONDITIONS

- A. Environmental limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60°F and 90°F and relative humidity between 25% and 55% during remainder of construction period.

#### 1.06 WARRANTY

- A. Special warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 IN in a 42 IN x 84 IN section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 IN in a 3 IN span.
  2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  3. Warranty period for solid-core interior doors: Life of installation.

### 2.0 PRODUCTS

#### 2.01 WOOD DOORS, GENERAL

- A. WDMA I.S.1-A Performance Grade: Heavy Duty.
  1. All doors must meet specified WDMA Performance Duty Level, including face screw holding requirement. Surface applied hardware shall be installed with screws; through bolts are not acceptable.
- B. Fire-rated wood doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 and UL 10C.
- C. Smoke- and draft-control door assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- D. Dutch doors:
  1. Provide Dutch doors with internal wood blocking, flush cut as required, without shelf.Provide 20 minute fire rating where indicated on door schedule.
- E. Wood-based particleboard-core doors:
  1. Provide wood-based particleboard core doors with a minimum density per ANSI A208.1, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking.

#### 2.02 PLASTIC LAMINATE FACED WOOD DOORS

- A. Provide plastic laminate faced doors of the types and designs shown on the Drawings, labeled or non-labeled as indicated on the Drawings or as required.
  1. Thickness: 1-3/4 IN.
  2. Surface material: High Pressure Decorative Laminate (HPDL) complying with NEMA LD3. Vertical and post formable grade laminates are not acceptable.

3. Color, pattern and finish: Wilsonart Tuscan Walnut #7921-38 to match existing doors to remain.
  4. Crossbands: One-piece High Density Fiberboard (HDF).
  5. Vertical edges: 1/8 IN thick high-impact laminate, applied after faces, matching face laminate.
  6. Top edge: Bond smooth PVC edge band to core, providing cleanable surface.
  7. Bottom edge: Positive sealer applied after completion of machining and fitting.
  8. Core: Wood-based particleboard.
  9. Construction: Five (5) plies.
  10. Face and core assembly adhesive: WDMA Type 1.
- B. Acceptable products:
1. "Marquis Series High Pressure Decorative Laminate Door" as manufactured by Marshfield Doors, Tel. 800-869-3667, Web [www.marshfielddoors.com](http://www.marshfielddoors.com).
  2. Equal products of other manufacturers approved in advance by the Architect.

### 2.03 LIGHT FRAMES AND LOUVERS

- A. Factory glazing: Refer to Section 08 81 00 Glass Glazing for glass view panels in flush wood doors. Factory install glass in fire rated doors and as required.
- B. Metal frames for light openings in fire-rated doors: Manufacturer's standard frame formed of 0.048 IN thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.
- C. Metal louvers:
1. Manufacturers: Subject to compliance with requirements, provide products by Anemostat or Air Louvers, Inc.
  2. Blade type: Vision-proof, inverted Y.
  3. Metal and finish: 18 gage cold rolled steel, with manufacturer's standard color baked-enamel- or powder-coated finish.
- D. Louvers for fire-rated doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 HRS and less.
1. Manufacturers: Subject to compliance with requirements, provide products by Anemostat or Air Louvers, Inc.
  2. Metal and finish: 18 gage cold rolled steel, with manufacturer's standard color baked-enamel- or powder-coated finish.

### 2.04 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and side panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
1. Light openings: Trim openings with moldings of material and profile indicated.
  2. Glazing: Factory install glazing in fire rated and factory finished doors. Comply with applicable requirements in Section 08 81 00 Glass Glazing.
  3. Louvers: Factory install louvers in prepared openings.



### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs. Any deficiencies must be corrected prior to door installation.
  - 2. Reject doors with defects.

#### 3.02 INSTALLATION

- A. Hardware: See Section 08 71 00 Door Hardware.
- B. Installation instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  - 1. Install fire-rated doors according to NFPA 80.
  - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-fitted doors:
  - 1. Using measurements obtained in the field from installed frames, machine the doors at the factory to fit the prescribed frames with proper clearance at top, bottom, and vertical edges.
  - 2. Factory cut openings and provide glazing moldings for glass or louvers.
  - 3. Factory machine doors for application of hardware.
  - 4. Align in frames for uniform clearance at each edge.
  - 5. Replace or rehang doors which are hingebound and do not swing or operate freely.
- D. Factory-finished doors: Do not trim factory finished doors for width.

#### 3.03 ADJUSTING

- A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.
- B. To prevent stile failure, ensure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.
- C. Finished doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

**08 31 16**  
**ACCESS PANELS & FRAMES**

1.0 GENERAL

1.01 SUMMARY

- A. Provide access panels and frames for walls where shown on the Drawings, as specified herein and as needed for a complete and proper installation.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  2. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades:
    - a. Include details of each frame type, elevation of panel, anchorage and accessory items.
    - b. Schedule showing each type of access panel and frame, locations, sizes, latching or locking provisions, and other data pertinent to installation
    - c. Indicate installation procedures and accessories required for a complete installation.

1.03 REFERENCES

- A. ASTM A153/A153M: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- B. ASTM A666: Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM F2329: Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with standards referenced in Paragraph 1.03 above.
- C. Provide access panels and frames produced by a single manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver, store, and handle access panels and frames using means and methods that will prevent damage, deterioration, or loss.
  1. Deliver units in manufacturer's original packaging, properly labeled for identification.

1.06 WARRANTY

- A. Provide manufacturer's 1 YR warranty against defects in materials and workmanship.

2.0 PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Design is based on use of standard products manufactured by J.L. Industries, a division of Activar Construction Products Group, Grand Prairie, Texas, and trade names of that manufacturer are used herein.
- B. Provide the products upon which the design is based or provide equal products of another manufacturer approved in advance by the Architect.

## 2.02 INTERIOR FLUSH ACCESS PANELS & FRAMES

- A. Where shown on the Drawings in walls, provide access panels with the following attributes:
  - 1. Model: TMS multi-purpose flush stainless steel access panel.
  - 2. Panel: 16 gage stainless steel mounted to frame with 90° continuous concealed hinge.
  - 3. Frame & trim: 16 gage stainless steel with 1 IN wall flange.
  - 4. Finish: Factory-applied ground and polished #4 directional satin finish.
  - 5. Lock option: Keyed cylinder lock installed.
  - 6. Size: Nominal opening 12 IN by 12 IN, mounted 8 IN AFF or as required for access of particular components.

## 2.03 MATERIALS

- A. Stainless steel sheet, strip, plate and flat bars: ASTM A666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- B. Frame anchors: Same type as panel face.
- C. Inserts, bolts and anchor fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.
- D. Furnish inserts and anchoring devices which must be built into other work for installation of access panels.
- E. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 2.04 FABRICATION

- A. General: Furnish each access panel assembly manufactured as an integral unit, complete and ready for installation.
- B. Metal surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Panels and frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panel frames to types of supports indicated.
- D. Latching mechanisms: Furnish number required to hold panels in flush, smooth plane when closed.
  - 1. For cylinder locks, key cylinders shall be Best or Arrow.
  - 2. Key cylinders shall accept owner approved cores.
  - 3. Furnish 2 keys per lock and key all locks alike.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Notify the Contractor in writing of conditions detrimental to proper and timely completion of the installation.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. Install panels flush with adjacent finish surfaces.

3.03 ADJUSTING & CLEANING

- A. Adjust access panels to operate easily without binding. Verify that integral locking/latching devices operate properly.
- B. Remove panels and frames that are warped, bowed, or otherwise damaged, and replace with new components.
- C. On completion of access panel installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Leave work area clean and free of debris.

END OF SECTION

**ALUMINUM-FRAMED ENTRANCES & STOREFRONTS**

## 1.0 GENERAL

## 1.01 SUMMARY

- A. Provide storefront framing system doors and windows where shown on the Drawings, as specified herein and as needed for a complete and proper installation, including but not necessarily limited to:
  - 1. Aluminum entrance doors.
  - 2. Storefront framing systems:
    - a. New exterior windows as scheduled.
    - b. Modify or replace existing framing systems at new entrance doors as required by finish hardware scheduled (new hinges vs existing pivots, etc.).
  - 3. Subsills.
- B. Related work:
  - 1. Section 08 71 00: Door Hardware.
  - 2. Section 08 81 00: Glass Glazing.

## 1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.

## 1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

## 1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

## 2.0 MATERIALS

## 2.01 APPROVED MANUFACTURERS

- A. Design is based on use of standard products manufactured by Kawneer Company, Inc., Irving, Texas, Tel. 214-438-1212, and trade names of that manufacturer are used herein.
- B. Provide the products upon which design is based or provide equal products of another manufacturer approved in advance by the Architect.
  - 1. Series 3000 Thermal Center Set Storefront System as manufactured by Oldcastle Building Envelope is an approved equal.
- C. Except as otherwise approved by the Architect, provide all products of this Section from a single manufacturer.

## 2.02 ENTRANCE DOORS

- A. Provide aluminum doors in the dimensions and arrangements shown on the Drawings, and with the following attributes:
  - 1. Type: 500, wide stile.
  - 2. Door rails and stiles: Extruded aluminum sections, 6063-T5 alloy, 0.125 IN wall thickness.
  - 3. Glazing gaskets: EPDM elastomeric extrusions.

- 2.03 STOREFRONT FRAMING SYSTEMS
- A. Provide exterior storefront framing system in the dimensions and arrangements shown on the Drawings, and with the following attributes:
1. Type: Tri-Fab II 451.
  2. Framing system: 2 IN x 4-1/2 IN extruded aluminum sections, 6063-T5 alloy, 0.125 IN wall thickness.
  3. Glazing gaskets: EPDM elastomeric extrusions.
- 2.04 SUBSILLS
- A. Provide aluminum subsills, 0.032 gage, fabricated to profile required.
- 2.05 FINISH
- A. All exposed aluminum shall be free of scratches and other serious blemishes and shall receive an Architectural Class I Anodic Coating conforming with Aluminum Association Standard AA-M10C21A44 #40 Dark Bronze (verify; match existing storefront to remain).
- 2.06 OTHER MATERIALS
- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 2.07 FABRICATION
- A. Fabricate in strict accordance with the manufacturers' specifications and Shop Drawings as approved by the Architect, prefabricating in the shop to the maximum extent practicable.
- B. Provide hairline fit at joints, with smooth continuity of line and accurate relation of planes and angles. Securely fasten with concealed fasteners of non-corrosive materials. All joints shall be made watertight.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.02 COORDINATION
- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Make measurements as required in the field to assure proper fit.
- 3.03 INSTALLATION
- A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- B. Upon completion of the installation, check all hardware for proper operation. Make required adjustments and assure that components are in optimum operating condition.

END OF SECTION

**08 71 00**  
**DOOR HARDWARE**

1.0 GENERAL

1.01 SUMMARY

- A. Furnish and install finish hardware specified herein and as needed for a complete and proper installation including, but not necessarily limited to:
  - 1. New finish hardware on new doors & frames.
  - 2. New finish hardware on existing doors & frames to remain.
  - 3. New finish hardware on existing doors & frames to be relocated.
- B. Door hardware includes, but is not necessarily limited to:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Cylinders specified for doors in other Sections.
- C. Related work:
  - 1. Section 06 40 00: Architectural Woodwork: Cabinet hardware.
  - 2. Section 08 11 13: Hollow Metal Doors & Frames.
  - 3. Section 08 14 23: Plastic Laminate Faced Wood Doors.
  - 4. Section 08 41 13: Aluminum Framed Entrances & Storefront.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
  - 2. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
    - b. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
    - c. Content: Include the following information:
      - 1) Type, style, function, size, label, hand, and finish of each door hardware item.
      - 2) Manufacturer of each item.
      - 3) Fastenings and other pertinent information.
      - 4) Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      - 5) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 6) Mounting locations for door hardware.
      - 7) Door and frame sizes and materials.
      - 8) Warranty information for each product.
    - d. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

3. Shop Drawings: Details of electrified access control hardware indicating the following:
  - a. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    - 1) Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    - 2) Complete (risers, point-to-point) access control system block wiring diagrams.
    - 3) Wiring instructions for each electronic component scheduled herein.
  - b. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
4. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
5. Informational Submittals:
  - a. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
6. Closeout Submittals:
  - a. Operating and maintenance manuals: Provide manufacturer's operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Section 01 77 00.
  - b. Project record documents: Provide record documentation of as-built hardware sets in digital format and as required in Section 01 78 00.

### 1.03 REFERENCES

- A. ANSI A117.1: American National Standard for Accessible and Usable Buildings and Facilities.
- B. ANSI/BHMA A156 Series: Certified Product Standards.
- C. ANSI/UL 294: Access Control System Units.
- D. ANSI/UL 437: Key Locks.
- E. IBC: International Building Code.
- F. NFPA 70: National Electric Code.
- G. NFPA 80: Standard for Fire Doors and Other Opening Protectives.
- H. NFPA 101 Life Safety Code.
- I. NFPA 105: Installation of Smoke Door Assemblies.
- J. Texas Civil Statutes, Article 9102, Architectural Barriers Act-Texas Accessibility Standards.
- K. UL 10C: Positive Pressure Fire Test of Door Assemblies.
- L. UL 305: Panic Hardware.

### 1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Manufacturers qualifications: Engage qualified manufacturers with 5 YRS MIN documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.



- C. Certified products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- D. Installer qualifications: 3 YRS MIN documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E. Door hardware supplier qualifications: Experienced commercial door hardware distributors with 5 YRS MIN documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- H. Keying Conference: Conduct conference to comply with requirements in Section 01 31 19. Keying conference to incorporate the following criteria into the final keying schedule document:
  - 1. Function of building, purpose of each area and degree of security required.
  - 2. Plans for existing and future key system expansion.
  - 3. Requirements for key control storage and software.
  - 4. Installation of permanent keys, cylinder cores and software.
  - 5. Address and requirements for delivery of keys.
- I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Section 01 31 00 with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  - 3. Review sequence of operation narratives for each unique access controlled opening.
  - 4. Review and finalize construction schedule and verify availability of materials.
  - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- J. Provide and locate finish hardware in accordance with Texas Civil Statutes, Article 9102, Architectural Barriers Act, Texas Accessibility Standards (TAS).
- K. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- C. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- D. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the Keying Conference.
- E. Stockpile items sufficiently in advance to assure their availability and make necessary deliveries in a timely manner to assure orderly progress of the total Work.

1.06 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and frame preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 MAINTENANCE

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide tools and accessories supplied by hardware component manufacturer.
- C. Maintenance service: Perform detailed inspection of door hardware approximately 6 months after Substantial Completion.
  - 1. Re-adjust every item of hardware and function of doors.
  - 2. Consult with and instruct Owner's personnel in recommended modifications and additions to maintenance procedures.
  - 3. Replace deteriorated or failed hardware items.
  - 4. Prepare written report of current and predictable problems in performance of hardware.

1.08 WARRANTY

- A. General warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Warranty period: Unless otherwise indicated, warranty shall be 1 YR from date of Substantial Completion.

## 2.0 PRODUCTS

### 2.01 GENERAL REQUIREMENTS FOR HARDWARE PRODUCTS

- A. Provide products that comply with applicable provisions of the following:
  - 1. Federal, State and local codes.
  - 2. ANSI A117.1.
  - 3. NFPA 101.
  - 4. Fire rated doors; NFPA 80.
  - 5. All hardware on fire rated doors; listed and classified by UL as suitable for the purpose specified and indicated.
- B. Single source for items: To the maximum extent practicable, furnish similar items (such as "door butts") only as the product of a single manufacturer (such as "McKinney").
- C. For each of the required items of finish hardware, provide from the specified manufacturer or other manufacturer approved by the Owner or Architect prior to bidding.
- D. Fasteners:
  - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.
  - 2. Where necessary, furnish fasteners with toggle bolts, expansion shields, sex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
  - 3. Provide fasteners which harmonize with the hardware as to finish and material.
- E. Where butts are required to swing 180°, furnish butts of sufficient throw to clear the trim.
- F. Furnish silencers for door frames at the rate of 3 for each single door and 2 for each door in a pair of doors; except weatherstripped doors and doors with light seals or sound seals.
- G. Finishes:
  - 1. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
  - 2. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
  - 3. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
  - 4. All hardware shall be ANSI/BHMA 626/US26D; satin chrome plated or similar, to match Owner hardware standards unless otherwise noted below.
    - a. All exterior hardware including hinges on the new aluminum storefront entrance doors shall be ANSI/BHMA 613/US10B; satin oxidized oil rubbed bronze or similar to match existing storefront and new storefront entrance doors.

### 2.02 MATERIAL REQUIREMENTS FOR HANDICAP ACCESSIBILITY

- A. Thresholds at doorways: Thresholds at doorways shall not exceed 3/4 IN in height for exterior sliding doors or 1/2 IN for other types of doors. Raised thresholds and floor level changes at accessible doorways shall be beveled with a slope no greater than 1:2.
- B. Door hardware: Handles, pulls, latches, locks and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate. Lever-operated mechanisms, push-type mechanisms, and U-shaped handles are acceptable designs. When sliding doors are fully open, operating hardware shall be exposed and usable from both sides. Hardware required for accessible door passage shall be mounted no higher than 48 IN AFF.
- C. Door closers: If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70°, the door will take at least 3 seconds to move to a point 3 IN from the latch, measured to the leading edge of the door.

- D. Door opening force: The MAX force for pushing or pulling open a door shall be as follows:
  - 1. Fire doors shall have the MIN opening force allowable by the appropriate administrative authority.
  - 2. Other doors:
    - a. Exterior hinged doors: Reserved.
    - b. Interior hinged doors 5 LBF
    - c. Sliding or folding doors: 5 LBF

These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.
- E. Automatic doors and power-assisted doors: If an automatic door is used, then it shall comply with ANSI/BHMA A156.10-1985. Slowly opening, low-powered, automatic doors shall comply with ANSI A156.19-1984. Such doors shall not open to back check faster than 3 seconds and shall require no more than 15 LBF to stop door movement. If a power-assisted door is used, its door-opening force shall comply with Paragraph D above and its closing shall conform to the requirements in ANSI A156.19-1984.

## 2.03 CYLINDERS AND KEYING

- A. General:
  - 1. Cylinder manufacturer to have 10 YRS MIN experience designing secured master key systems and have on record a published security keying system policy.
  - 2. All locks to be keyed and masterkeyed "Best" Hardware to match existing masterkey system.
- B. Cylinder types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
  - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  - 4. Tubular deadlocks and other auxiliary locks.
  - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 6. Keyway: Manufacturer's Standard.
- C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
  - 1. Supplier shall conduct a Keying Conference to define and document keying system instructions and requirements.
  - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  - 3. Existing system: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following MIN number of keys:
  - 1. Change Keys per Cylinder: 2.
  - 2. Master Keys (per Master Key Level/Group): 5.
  - 3. Construction Keys (where required): 15.
- F. Construction Keying:
  - 1. Provide construction master keyed cylinders.
  - 2. Use only the construction keys during construction.
  - 3. Upon Substantial Completion of the Work, as that Date is established by the Architect, void the construction key system and, in the presence of the Architect, demonstrate that the specified keying system is operating properly.
- G. Key Registration List (Bitting List):
  - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  - 2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.04 KEY CONTROL

- A. Key control cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
  - 1. Manufacturers:
    - a. Lund Equipment (LU).
    - b. MMF Industries (MM).
    - c. Telkee (TK).
- B. Electronic key management system: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. MIN 1,000 system users and 21 iFobs for locking receptors. System shall have MIN 250,000 audit events screen displayed or ability to be exported via USB port.
  - 1. Manufacturers:
    - a. Medeco (MC).

## 2.05 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two hinges: For doors with heights up to 60 IN.
    - b. Three hinges: For doors with heights 61 to 90 IN.
    - c. Four hinges: For doors with heights 91 to 120 IN.
    - d. For doors with heights more than 120 IN, provide 4 hinges, plus 1 hinge for every 30 IN of door height greater than 120 IN.
  - 2. Hinge size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3 FT 0 IN: 4-1/2 IN standard or heavy weight as specified.
    - b. Sizes from 3 FT 1 IN to 4 FT 0 IN: 5 IN standard or heavy weight as specified.
  - 3. Hinge weight and base material: Unless otherwise indicated, provide the following:
    - a. Exterior doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  - 4. Hinge options: Comply with the following:
    - a. Non-removable Pins: With the exception of electric through-wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  - 5. Manufacturers:
    - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

## 2.06 FLOOR CLOSERS AND PIVOTS

- A. Pivots: ANSI/BHMA A156.4, Grade 1; space intermediate pivots equally not less than 25 IN OC apart or not more than 35 IN OC for doors over 121 IN high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.
  - 1. Manufacturers:
    - a. Norton Rixson (RF).

## 2.07 POWER TRANSFER DEVICES

- A. Concealed quick connect electric power transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
  - 1. Manufacturers:
    - a. Pemko (PE) - EL-CEPT Series.
    - b. Securitron (SU) - EL-CEPT Series.
- B. Electric door wire harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, MIN 2 per electrified opening.
  - 1. Provide one each of the following tools as part of the base bid contract:
    - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    - b. McKinney (MK) - Connector Hand Tool: QC-R003.
  - 2. Manufacturers:
    - a. McKinney (MK) - QC-C Series.

## 2.08 DOOR OPERATING TRIM

- A. Flush bolts and surface bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
  - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately 6 FT from the floor.
  - 2. Furnish dust proof strikes for bottom bolts.
  - 3. Surface bolts to be MIN 8 IN length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  - 5. Manufacturers:
    - a. Rockwood (RO).
- B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
  - 1. Manufacturers:
    - a. Rockwood (RO).
- C. Door push plates and pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Door Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  - 1. Push/pull plates: MIN .050 IN thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  - 2. Door pull and push bar design: Size, shape, and material as indicated in the hardware sets. MIN clearance of 2-1/2 IN from face of door unless otherwise indicated.
  - 3. Offset pull design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2-1/2 IN from face of door and offset of 90 degrees unless otherwise indicated.
  - 4. Pulls, where applicable, shall be provided with a 10 IN clearance from the finished floor on the push side to accommodate wheelchair accessibility.
  - 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Door Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
  - 6. Manufacturers:
    - a. Rockwood (RO).

## 2.09 MORTISE LOCK AND LATCHING DEVICES

- A. Mortise locksets, Grade 1 (heavy duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
  - 1. Manufacturers:
    - a. Sargent Manufacturing (SA) - 8200 Series.
    - b. No Substitution.

## 2.10 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-lip strikes: For locks with three-piece anti-friction latchbolts, as recommended by manufacturer.
  - 2. Extra-long-lip strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-frame strike box: Provide manufacturer's special strike box fabricated for aluminum framing.
  - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  - 1. Strikes for mortise locks and latches: BHMA A156.13.
  - 2. Strikes for bored locks and latches: BHMA A156.2.
  - 3. Strikes for auxiliary deadlocks: BHMA A156.36.
  - 4. Dustproof strikes: BHMA A156.16.

## 2.11 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  - 1. Exit devices shall have a 5 YR warranty.
  - 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Door Hardware Sets.
  - 3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  - 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  - 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  - 6. Lever operating trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock trim design: As indicated in Door Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (rim or mortise) as specified in Door Hardware Sets.
  - 7. Vertical rod exit devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  - 8. Narrow stile applications: At doors constructed with narrow stiles, or as specified in Door Hardware Sets, provide devices designed for MAX 2 IN wide stiles.
  - 9. Dummy push bar: Nonfunctioning push bar matching functional push bar.
  - 10. Rail sizing: Provide exit device rails factory sized for proper door width application.

11. Through bolt installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional push rail exit devices (heavy duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
  1. Manufacturers:
    - a. Sargent Manufacturing (SA) - 80 Series.
    - b. No Substitution.

## 2.12 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
  1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL 10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door closers, surface mounted (large body cast iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
  1. Large body cast iron surface mounted door closers shall have a 30 YR warranty.
  2. Manufacturers:
    - a. Sargent Manufacturing (SA) - 281 Series.
    - b. No Substitution.
- C. Door closers, surface mounted (commercial duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
  1. Manufacturers:
    - a. Sargent Manufacturing (SA) - 1431 Series.
    - b. No Substitution.

## 2.13 ARCHITECTURAL TRIM

- A. Door protective trim
  1. General: Door protective trim units to be of type and design as specified below or in the Door Hardware Sets.
  2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2 IN less than door width (LDW) on stop side of single doors and 1 IN LDW on stop side of pairs of doors, and not more than 1 IN less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Door Hardware Sets.



3. Where plates are applied to fire rated doors with the top of the plate more than 16 IN above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless steel: 300 grade, 050 IN thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Door Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Rockwood (RO).

#### 2.14 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Door Hardware Sets.
- B. Door stops and bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Door Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. Rockwood (RO).
- C. Overhead door stops and holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Door Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  1. Manufacturers:
    - a. Norton Rixson (RF).
    - b. Rockwood (RO).

#### 2.15 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Door Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke labeled gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire labeled gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10C.
  1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-rated gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable seal strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  1. Pemko (PE).

## 2.16 ELECTRONIC ACCESSORIES

- A. Door position switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1 IN DIA hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
  - 1. Manufacturers:
    - a. Securitron (SU) - DPS Series.
- B. Switching power supplies: Provide power supplies with either single or dual voltage configurations at 12 or 24VDC. Power supplies shall have battery backup function with an integrated battery charging circuit and shall provide capability for power distribution, direct lock control and Fire Alarm Interface (FAI) through add on modules. Power supplies shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs.
  - 1. Manufacturers:
    - a. Securitron (SU) - AQD Series.

## 2.17 OTHER MATERIALS

- A. Threshold sealant: One component polyurethane sealant complying with FS TT-S-00230C, Type II, Class A, ASTM C920, equal to "Dynatrol I" as manufactured by Pecora Corporation, Dallas, Texas, Tel. 800-233-9754.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- C. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.02 COORDINATION

- A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Secure templates from manufacturers as required and distribute to suppliers of doors and other items as required to assure proper fit of mill-installed units.
- C. Distribute finish hardware components to other trades as required and provide proper direction regarding correct installation and adjustment of all units.

### 3.03 PREPARATION

- A. Hollow metal doors and frames: Comply with ANSI/DHI A115 Series.
- B. Wood doors: Comply with ANSI/DHI A115-W Series.

### 3.04 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

- B. Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulation:
  - 1. For all doors: Install hardware for barrier free access in accordance with Texas Accessibility Standards (TAS).
  - 2. For aluminum doors: Comply with DHI's Processing Hardware for Custom Aluminum Entrances.
  - 3. For steel doors and frames: Comply with DHI's Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
  - 4. For wood doors: Comply with DHI's Recommended Locations for Architectural Hardware for Flush Wood Doors.
  - 5. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Push plates and door pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in this Section.
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.05 ADJUSTING AND REPAIR

- A. Upon completion of installation of finish hardware, and as a condition of its acceptance, make a complete inspection of all installed items.
- B. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- C. Test barrier free doors for 5 LB MAX opening force, make required adjustments and achieve optimum operation.
- D. Repair scratches and abrasions or if unrepairable, replace such damaged item with new identical item at no additional cost to the Owner.

### 3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.08 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the Owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's abbreviations:

1. MK – McKinney.
2. RF – Rixson
3. SU – Securitron.
4. RO – Rockwood.
5. SA – Sargent.
6. BE – Best.
7. PE – Pemko.
8. OT – Other.
9. AC – Alarm Controls.

C. Hardware sets:

Set: 1.0      Doors: 47 (Entry Lobby)  
Description: EXTERIOR STOREFRONT PAIR CARD READER RIM EXIT

4	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	10BE	MK	
2	Hinge, Full Mortise, Hvy Wt	T4A3386 QC8 4-1/2" x 4-1/2"	10BE	MK	
1	Mullion	L980S 86"	PC	SA	
1	Rim Exit Dev, Storeroom, REX, MELR	LD 55 56 70 8804	US32D	SA	⚡
1	Rim Exit Dev, Dummy, REX	LD 55 56 8810	US32D	SA	⚡
1	Cylinder	70 980C1	US26D	SA	
2	SFIC Permanent Core	Match Facility Standard		BE	
2	Surface Closer w/Stop	281 CPS	EN	SA	
2	Drop Plate	281D	EN	SA	
2	Offset Pulls	B157 x 10BE		RO	
1	Astragal	By Storefront Mfr		OT	
1	Rain Guard	346C + 4" ODW		PE	
1	Perimeter Seals	By Storefront Mfr		OT	
2	Sweep	315CN		PE	
1	Threshold	171A		PE	
2	ElectroLynx Harness	QC-C1500P		MK	⚡
2	ElectroLynx Harness	QC-C x Length Req'd x P		MK	⚡
2	Position Switch	DPS-M-GR		SU	⚡
1	Power Supply	AQD x Amps Required		SU	⚡
1	Card Reader	Provided by Owner		OT	

Notes: ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 2.0      Doors: 48 (Corridor 2)  
Description: EXTERIOR STOREFRONT SGL CARD READER RIM EXIT

1	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	10BE	MK	
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC8 4-1/2" x 4-1/2"	10BE	MK	
1	Rim Exit Dev, Storeroom, REX, MELR	LD 55 56 70 8804	US32D	SA	⚡
1	SFIC Permanent Core	Match Facility Standard		BE	
1	Surface Closer w/Stop	281 CPS	EN	SA	
1	Offset Pull	B157	10BE	RO	
1	Drop Plate	281D	EN	SA	
1	Rain Guard	346C + 4" ODW		PE	
1	Perimeter Seals	By Storefront Mfr		OT	

1	Sweep	315CN	PE	
1	Threshold	171A	PE	
1	ElectroLynx Harness	QC-C1500P	MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
1	Position Switch	DPS-M-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡
1	Card Reader	Provided by Owner	OT	

Notes: ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 3.0 Doors: 41 (Corridor – West)

Description: EXTERIOR HM SGL CARD READER RIM EXIT (EPT) WIDE

3	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D MK	
1	Electric Power Transfer Door Loop	DL-2	AC	⚡
1	Rim Exit Dev, Storeroom, REX, MELR	LD 55 56 70 8804 J 862	US32D SA	⚡
1	SFIC Permanent Core	Match Facility Standard	BE	
1	Surface Closer w/Stop	281 CPS	EN SA	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Gasketing	2891AV Head x Jambs	PE	
1	Rain Guard	346C + 4" ODW	PE	
1	Sweep	315CN	PE	
1	Threshold	171A	PE	
1	ElectroLynx Harness	QC-C1500P	MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
1	Position Switch	DPS-M-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡

Notes: RE-USE EXISTING WALL MOUNTED CARD READER.

ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 4.0 Doors: 42 (Receiving), 43 (Facilities Maint Storage), 45 (Corridor 6), 46 (Stairs – East)

Description: EXTERIOR HM SGL CARD READER LOCK

2	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D MK	
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC8 4-1/2" x 4-1/2"	US32D MK	⚡
1	Rim Exit Device, Storeroom, REX, ELR	LD 55 56 70 8804 862	US26D SA	⚡
1	SFIC Permanent Core	Match Facility Standard	BE	
1	Surface Closer w/Stop	281 CPS	EN SA	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Gasketing	2891AV Head x Jambs	PE	
1	Rain Guard	346C + 4" ODW	PE	
1	Sweep	315CN	PE	
1	Threshold	171A	PE	
1	ElectroLynx Harness	QC-C1500P	MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
1	Position Switch	DPS-M-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡

Notes: RE-USE EXISTING WALL MOUNTED CARD READER.

ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 5.0      Doors: 44 (Staff Corr 6)  
 Description: EXTERIOR HM SGL RIM EXIT MONITORED (EPT)

3	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D MK	
1	Electric Power Transfer Door Loop	DL-2	AC	⚡
1	Rim Exit Device, Dummy, REX	LD 55 8810 862	US32D SA	⚡
1	Surface Closer w/Stop	281 CPS	EN SA	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Gasketing	2891AV Head x Jambs	PE	
1	Rain Guard	346C + 4" ODW	PE	
1	Sweep	315CN	PE	
1	Threshold	171A	PE	
1	ElectroLynx Harness	QC-C1500P	MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
1	Position Switch	DPS-M-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡

Set: 6.0      Doors: 60 (Staff Corr 1)  
 Description: WD PAIR CARD READER RIM EXIT CLOSER/STOP

4	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
2	Hinge, Full Mortise	TA2714 QC12 4-1/2" x 4-1/2"	US26D MK	⚡
1	Mullion	L980S 86"	PC SA	
1	Rim Exit Dev, Storeroom, REX, MELR	LD 55 56 70 8804 862	US32D SA	⚡
1	Rim Exit Device, Dummy, REX	LD 55 8810	US32D SA	⚡
1	Cylinder	70 980C1	US26D SA	
2	SFIC Permanent Core	Match Facility Standard	BE	
2	Surface Closer w/Stop	1431 CPS	EN SA	
2	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Gasketing (Mullion)	5110BL	PE	
2	Silencer	608-RKW	RO	
2	ElectroLynx Harness	QC-C1500P	MK	⚡
2	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
2	Position Switch	DPS-W-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡
1	Card Reader	Provided by Owner	OT	

Notes: ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 7.0      Doors: 38 (Data/Records)  
 Description: HM PAIR CARD READER LOCK CLOSER/STOP

4	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
2	Hinge, Full Mortise	TA2714 QC8 4-1/2" x 4-1/2"	US26D MK	⚡
1	Fail Secure Lock	RX 70 8271 LNL	US26D SA	⚡
2	Manual Flush Bolt	555	US26D RO	⚡
1	Dust Proof Strike	570	US26D RO	
1	SFIC Permanent Core	Match Facility Standard	BE	
2	Surface Closer w/Stop	1431 CPS	EN SA	
2	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
2	Silencer	608-RKW	RO	
2	ElectroLynx Harness	QC-C1500P	MK	⚡
2	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
2	Position Switch	DPS-M-GR	SU	⚡

1	Power Supply	AQD x Amps Required	SU	⚡
1	Card Reader	Provided by Owner	OT	

Notes: ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 8.0      Doors: 40 (Receiving)  
Description: PAIR A/I CARD READER LOCK

5	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
1	Hinge, Full Mortise	TA2714 QC8 4-1/2" x 4-1/2"	US26D MK	⚡
2	Manual Flush Bolt	555	US26D RO	
1	Dust Proof Strike	570	US26D RO	
1	Fail Secure Lock	RX 70 8271 LNL	US26D SA	⚡
1	SFIC Permanent Core	Match Facility Standard	BE	
2	Surface Closer	1431 O	EN SA	
2	Kick Plate (Pairs)	K1050 10" x 1" LDW CSK BEV	US32D RO	
2	Wall Stop	406	US32D RO	
2	Silencer	608-RKW	RO	
1	ElectroLynx Harness	QC-C1500P	MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P	MK	⚡
1	Position Switch	DPS-M-GR	SU	⚡
1	Power Supply	AQD x Amps Required	SU	⚡
1	Card Reader	Provided by Owner	OT	

Notes: ENTRY VIA PRESENTATION OF AUTHORIZED PROXIMITY CREDENTIAL OR MECHANICAL KEY OVERRIDE. REQUEST-TO-EXIT INTEGRATED IN LATCHING HARDWARE. DOOR STATUS MONITORED. FREE EGRESS AT ALL TIMES. OPENING NORMALLY CLOSED AND SECURED.

Set: 9.0      Doors: 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 (Probation 1-26), 30, 31, 32 (Manager 1-3)  
Description: SGL OFFICE / ENTRY FUNCTION (NO CLOSER)

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
1	Office/Entry Lock	70 8205 LNL	US26D SA	
1	SFIC Permanent Core	Match Facility Standard	BE	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Wall Stop	406	US32D RO	
3	Silencer	608-RKW	RO	

Set: 10.0      Doors: 36 (Breakroom)  
Description: SGL PASSAGE FUNCTION (NO CLOSER)

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
1	Passage Latch	70 8215 LNL	US26D SA	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	
1	Wall Stop	406	US32D RO	
3	Silencer	608-RKW	RO	

Set: 11.0      Doors: 01 (Lobby), 03 (Work/File Room), 49 (Facilities Maint Storage), 50 (Lobby)  
Description: SGL CARD READER ELEC FAIL SECURE MORTISE LOCK REX/DPS

2	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK	
1	Hinge, Full Mortise	TA2714 QC8 4-1/2" x 4-1/2"	US26D MK	⚡
1	Fail Secure Lock	RX 70 8271 LNL	US26D SA	⚡
1	SFIC Permanent Core	Match Facility Standard	BE	
1	Surface Closer (03, 49, 50)	1431 O	EN SA	
1	Surface Closer (01)	1431 P9	EN SA	
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO	

1	Wall Stop	406	US32D	RO	
3	Silencer	608-RKW		RO	
1	ElectroLynx Harness	QC-C1500P		MK	⚡
1	ElectroLynx Harness	QC-C x Length Req'd x P		MK	⚡
1	Position Switch	DPS-M-GR		SU	⚡
1	Power Supply	AQD x Amps Required		SU	⚡

Notes: Doors 01, 03, 49 are welded steel frames, Door 50 is knock-down steel frame.

Set: 12.0 Doors: 37 (Lg Conference)

Description: SGL OFFICE / ENTRY FUNCTION INSWING WIDE

3	Hinge, Full Mortise, Hvy Wt	T4A3786 5" x 4-1/2"	US26D	MK
1	Office/Entry Lock	70 8205 LNL	US26D	SA
1	SFIC Permanent Core	Match Facility Standard		BE
1	Surface Closer	1431 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW		RO

Set: 13.0 Doors: 35 (Storage)

Description: SGL STOREROOM FUNCTION (NO CLOSER)

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	70 8204 LNL	US26D	SA
1	SFIC Permanent Core	Match Facility Standard		BE
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW		RO

Set: 14.0 Doors: 39 (Constable Storage)

Description: SGL STOREROOM FUNCTION INSWING

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	70 8204 LNL	US26D	SA
1	SFIC Permanent Core	Match Facility Standard		BE
1	Surface Closer	1431 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW		RO

Set: 15.0 Doors: 57 (Janitor), 59 (Fire Riser)

Description: SGL STOREROOM FUNCTION OUTSWING

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	70 8204 LNL	US26D	SA
1	SFIC Permanent Core	Match Facility Standard		BE
1	Surface Closer	1431 P9	EN	SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW		RO

Set: 16.0 Doors: 55 (Elevator Equip)

Description: SGL STOREROOM FUNCTION OUTSWING CLOSER/STOP

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	70 8204 LNL	US26D	SA
1	SFIC Permanent Core	Match Facility Standard		BE
1	Surface Closer w/ Stop	1431 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
3	Silencer	608-RKW		RO

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920 E. Park Boulevard, Plano, Texas

Door Hardware  
08 71 00-18



Set: 17.0 Doors: 33, 56 (Men's Lav), 34, 58 (Women's Lav)

Description: SGL CLASSROOM DEADLOCK FUNCTION (GANG RR) Push Pull

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK
1	Classroom Dead Lock	70 4877	US26D SA
1	Pull Plate	111 x 70C	US26D RO
1	Push Plate	70C RKW	US26D RO
1	SFIC Permanent Core	Match Facility Standard	BE
1	Surface Closer	1431 O	EN SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO
1	Mop Plate	K1050 6" x 1" LDW CSK BEV	US32D RO
1	Wall Stop	406	US32D RO
3	Silencer	608-RKW	RO

Set: 18.0 Doors: 02 (UA Restroom)

Description: SGL KEYED PRIVACY FUNCTION (SGL USE RR)

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK
1	Institutional Privacy Lock w/Indicator	50 70 8267 LNL	US26D SA
1	SFIC Permanent Core	Match Facility Standard	BE
1	Surface Closer	1431 O	EN SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO
1	Mop Plate	K1050 6" x 1" LDW CSK BEV	US32D RO
1	Wall Stop	406	US32D RO
3	Silencer	608-RKW	RO

Set: 19.0 Doors: 51 (Sm Conf), 52 (Housekeeping), 53 (Staff Corr), 54 (Tel/Elec)

Description: SGL STOREROOM FUNCTION REUSE EXISTING READER and ELECTRIC STRIKE

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D MK
1	Storeroom/Closet Lock	70 8204 LNL	US26D SA
1	SFIC Permanent Core	Match Facility Standard	BE
1	Surface Closer	1431 P9	EN SA
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D RO
1	Wall Stop	406	US32D RO
3	Silencer	608-RKW	RO

END OF SECTION

**08 81 00  
GLASS GLAZING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide glass and glazing accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 08 11 13: Hollow Metal Doors & Frames.
  - 2. Section 08 41 13: Aluminum Framed Entrances & Storefronts.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements, including installation and maintenance instructions.
  - 2. Samples:
    - a. 12 IN x 12 IN sample of 1 IN insulating glass unit.
    - b. 12 IN x 12 IN sample of 1/4 IN plate glass unit.
    - c. 12 IN x 12 IN sample of 3/8 IN pencil-polished edge glass.

1.03 REFERENCES

- A. AAMA 800: Voluntary Specifications and Test Methods for Sealants.
- B. ANSI Z97.1: Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- C. ASTM C509: Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
- D. ASTM C864: Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers.
- E. ASTM C920: Standard Specification for Elastomeric Joint Sealants.
- F. ASTM C1036: Standard Specification for Flat Glass.
- G. ASTM C1048: Standard Specification for Heat-Treated Flat Glass; Kind HS, Kind FT Coated and Uncoated Glass.
- H. ASTM C115: Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
- I. ASTM C1193: Standard Guide for Use of Joint Sealants.
- J. ASTM C1376: Standard Specification for Pyrolitic and Vacuum Deposition Coatings on Flat Glass.
- K. ASTM E773: Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
- L. ASTM E774: Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.
- M. ASTM E2188: Standard Test Method for Insulating Glass Unit Performance.
- N. ASTM E2190: Standard Specification for Insulating Glass Unit Performance and Evaluation.
- O. Federal Safety Standards for Architectural Glazing Materials 16CFR1201-I.II.
- P. IGMA TM-3000: Glazing Guidelines for Sealed Insulating Units.
- Q. GANA Glazing Manual.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Perform work in accordance with GANA Glazing Manual, IGMA Glazing Guidelines, ASTM C1193 and other pertinent codes and regulations of governmental agencies having jurisdiction.

- C. Installer qualifications: Company specializing in performing the work of this Section with 5 YRS MIN documented experience and approved by glass product manufacturer/fabricator.
- D. Source limitations for glass: Obtain the following through one source from a single manufacturer for each glass type: Clear float glass, coated float glass and insulating glass.
- E. Insulating glass certification program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of one of the following testing and inspecting agency.
  - 1. Insulating Glass Certification Council.
  - 2. Associated Laboratories, Inc.
  - 3. Insulating Glass Manufacturers Alliance.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery:
  - 1. Deliver glass to site in accordance with manufacturer's instructions.
  - 2. Deliver glass in manufacturer's or fabricator's original containers and packaging, with labels intact, indicating product name and manufacturer, strength, grade, thickness, type and quality.
  - 3. Sequence deliveries to avoid delays but minimize on-site storage.
- B. Storage:
  - 1. Store glass in accordance with manufacturer's instructions.
  - 2. Store glass in clean, dry area indoors.
  - 3. Protect from exposure to direct sunlight, freezing temperatures, moisture, excess heat, sparks and flame.
  - 4. Apply temporary coverings loosely to allow adequate ventilation.
  - 5. Protect from contact with corrosive chemicals.
  - 6. Avoid placement of glass edge on concrete, metal and other hard objects.
  - 7. Rest glass on clean, cushioned pads at 1/4-points.
- C. Handling:
  - 1. Handle glass in accordance with manufacturer's instructions.
  - 2. Protect glass from damage during handling and installation.
  - 3. Do not slide one light of glass against another.
  - 4. Do not use sharp objects near unprotected glass.

#### 1.06 PROJECT CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50°F.
- B. Maintain MIN ambient temperature before, during and 24 HRS after installation of glazing.

#### 1.07 WARRANTY

- A. Provide manufacturer's standard warranty for sealed insulating glass units, signed by insulating glass product manufacturer/fabricator, agreeing to replace insulating glass units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surfaces of glass, within 10 YRS of date of Substantial Completion.

### 2.0 PRODUCTS

#### 2.01 GLASS

- A. Provide the type and thickness shown on the Drawings, specified herein or as directed by the Architect.
- B. Plate or float glass:
  - 1. 1/4 IN glass complying with ASTM C1036, Type I, transparent flat, Class as applicable, Quality Q3 glazing select.
  - 2. Clear or tinted bronze as scheduled.

- C. Tempered glass:
1. Provide tempered or heat-strengthened glass where indicated on the Drawings, and elsewhere as required by governmental agencies having jurisdiction.
  2. Glass for tempering:
    - a. 1/4 IN and 3/8 IN polished plate glass complying with ASTM C1048, Condition A uncoated, Type I, transparent flat, Class as applicable, Quality Q3 glazing select.
  3. Sizes and cutting:
    - a. Prior to tempering or heat treating, cut glass to required sizes as determined by accurate measurements of the openings to be glazed, making allowances for required edge clearances.
    - b. Cut and process edges in accordance with the glass manufacturer's recommendations.
      - 1) Provide pencil-polished edges, ground smooth with a light curve and finished with a gloss polish where shown on the drawings for service windows with exposed edges.
    - c. Do not cut or treat edges in the field.
  4. Fully tempered glass:
    - a. Wherever possible, locate tong marks along an edge which will be concealed in the glazing system.
    - b. Permit minimum warpage practicable.
  5. Heat-strengthened glass:
    - a. Strengthen by the manufacturer's standard heat-treating process, increasing flexural strength to not less than twice the strength before treatment.
    - b. Permit MIN warpage practicable.
  6. Wired glass:
    - a. 1/4 IN clear glass complying with ASTM 1048, Type II (patterned flat glass), Class as applicable, Quality Q8 glazing.
    - b. Embedded stainless steel wire mesh in 1/2 IN x 1/2 IN diamond pattern.
    - c. Polished both sides.
    - d. Approved manufacturer: Anemostat Door Products.
- D. Mirrors:
1. Provide 1/4 IN polished glass of sizes shown on the Drawings.
  2. Mirrors shall have heavy electroplated coating of copper over best grade of silvering.
  3. Edges shall be ground smooth and slightly rounded.
- E. Exterior insulating glass:
1. Provide 1 IN double glazed tinted solar control insulating glass units where shown on the Drawings and with the following attributes:
    - a. Conformance: ASTM E2190.
    - b. Outdoor lite: Solarbronze tinted float glass.
      - 1) Conformance: ASTM C1036, Type 1, Class 2, Quality q3.
      - 2) Glass thickness: 1/4 IN.
      - 3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C1376.
      - 4) Coating: Solarban 70 on Surface #2.
      - 5) Heat-treatment: All glass shall be heat-strengthened, ASTM C1048, Kind HS except where tempered glass, ASTM C1048, Kind FT, Safety Glazing is shown on the Drawings or mandated for safety or other purposes by code.
    - c. Interspace content: Air 1/2 IN.
    - d. Indoor lite: Clear float glass.
      - 1) Conformance: ASTM C1036, Type 1, Class 1, Quality q3.
      - 2) Heat-treatment: All glass shall be heat-strengthened, ASTM C1048, Kind HS except where tempered glass, ASTM C1048, Kind FT, Safety Glazing is shown on the Drawings or mandated for safety or other purposes by code.
      - 3) Glass thickness: 1/4 IN.

- e. Performance requirements:
  - 1) Visible Light Transmittance: 39% MIN.
  - 2) Winter Nighttime U-Factor: 0.28 (BTU/HR\*FT<sup>2</sup>\*°F) MAX.
  - 3) Summer Daytime U-Factor: 0.26 (BTU/HR\*FT<sup>2</sup>\*°F) MAX.
  - 4) Shading Coefficient: 0.23 MAX.
  - 5) Light to Solar Gain (LSG): 1.95.
  - 6) Solar Heat Gain Coefficient (SHGC): 0.20 MAX.
  - 7) Exterior Visible Light Reflectance: 8% MAX.
- 2. Acceptable products:
  - a. "Solarban 70 on Solarbronze (2) / Air 1/2" / Clear" as manufactured Vitro Architectural Glass (formerly PPG), Cheswick, PA 15024, Tel. 855-6457, Web [www.vitroglazings.com](http://www.vitroglazings.com), contact Lisa Li, Tel. 940-733-9080, Email [lli@vitro.com](mailto:lli@vitro.com), and local fabricators Columbia Commercial Building Products, Rockwall, TX; Oldcastle Building Envelope, Grand Prairie, TX; TriStar Glass, Grand Prairie, TX.
  - b. Equal products of other manufacturers including but not limited to AFG, Guardian, and Pilkington.

## 2.02 GLAZING ACCESSORIES

- A. Glazing gaskets:
  - 1. Dense compression gaskets: Comply with ASTM C864, neoprene or EPDM, or ASTM C1115, silicone or thermoplastic polyolefin rubber, as recommended by glazing product manufacturer for application, molded or extruded shape to fit glazing channel retaining slot; black color.
  - 2. Soft compression gaskets: Comply with ASTM C509, Type II, black, molded or extruded, neoprene, EPDM, silicone or thermoplastic polyolefin rubber, of profile and hardness to maintain watertight seal.
- B. Setting blocks: Neoprene, 80 to 90 shore A durometer hardness; length 4 IN, width of glazing rabbet space less 1/16 IN, height required for glazing method, pane weight, and pane area, complying with ASTM C864.
- C. Spacer shims: Neoprene, 50 to 60 Shore A durometer hardness; length 3 IN, one half height of glazing stop, thickness required for application, one face self-adhesive, complying with ASTM C864.
- D. Edge blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Glazing sealants: Provide single-component, neutral curing, non-bleeding, non-staining sealant, complying with ASTM C920, Type S or M, Grade NS, Class 25, as made by Pecora Corporation, Dow Corning Corporation, GE Plastics or Tremco, Inc.
- F. Glazing tape: Closed cell polyvinyl chloride foam, MAX water absorption by volume 2%, designed for 25% compression for air barrier and vapor retarder seal, black color, coiled on release paper over adhesive on two sides; widths required for specified installation, and complying with AAMA 800.
- G. Cleaners, primers and sealers: As recommended by sealant or gasket manufacturer.

## 2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify that glazing channels are clean and ready to accept glazing installation, and that weeps are unobstructed. Confirm that MIN required face and edge clearances will be maintained. Do not proceed with glazing until unsatisfactory conditions have been corrected.

- C. Examine glazing units prior to setting. Reject units that display edge or face damage that may impede performance of unit or that will be visible when installed.

### 3.02 PREPARATION

- A. Clean glazing channels with recommended solvent and wipe dry.
- B. Apply primers to joint surfaces to ensure adhesion of sealants, unless preconstruction sealant-substrate testing indicates no primer is required.
- C. Install sealants in accordance with ASTM C1193, GANA and IGMA.

### 3.03 GLAZING INSTALLATION

- A. General: Install glass and glazing materials in accordance with manufacturer's instructions and requirements of GANA Glazing Manual.
  - 1. Install setting blocks of size and in location required by glass manufacturer. Set blocks in bed of approved sealant.
  - 2. Provide spacers for glass lites as recommended, based upon size of glass unit.
  - 3. Comply with glass manufacturer's limits on edge pressures.
  - 4. Ensure that glazing units are set with proper and consistent orientation of glass units toward interior and exterior.
  - 5. Provide edge blocking where recommended.
  - 6. Install sealants in accordance with requirements of Section 07 92 00 Joint Sealants.
- B. Tape glazing: Place tapes on fixed stops positioned to be flush or protrude slightly when compressed by glass. Install tapes continuously. Form butt joints at corners and where required, and seal tape joints with approved sealant.
  - 1. Apply heel bead of glazing sealant along intersection of permanent stop and frame for continuity of air and vapor seal.
  - 2. Set glass lites centered in openings on setting blocks.
  - 3. Install removable stops, and insert dense compression gaskets at corners, work toward centers of lites, compressing glass against tape on fixed stops.
  - 4. Apply cap bead of elastomeric sealant over exposed edge of tape or gasket on exterior of glass unit.
- C. Sealant glazing: Install continuous spacers between glass lites and glazing stops. Install cylindrical sealant backing where recommended, in width and depth recommended to provide proper depth and width of sealant bead. Ensure sealant cannot block weep system.
  - 1. Install sealant under pressure to completely fill glazing channel without voids, with full bond to glass and channel surfaces.
  - 2. Tool sealant bead to proper profile providing wash away from glass.
- D. Sealant glazing for butt glazing:
  - 1. Brace glass in position for during of glazing process.
  - 2. Mask edges of glass at adjoining glass edges and between glass edges and framing members.
  - 3. Secure small DIA non-adhering foamed rod on back side of joint.
  - 4. Apply sealant to open side of joint in continuous operation; completely fill joint without displacing foam rod; tool sealant surface smooth to concave profile.
  - 5. Allow sealant to cure, then remove foam backer rod.
  - 6. Apply sealant to opposite side; tool sealant smooth to concave profile.
  - 7. Remove masking tape.
- E. Gasket glazing: Fabricate gaskets to fit openings exactly. Allow for stretching of gaskets during installation.
  - 1. Set soft compression gasket against fixed stop or frame, secure, with bonded miter cut joints at corners.
  - 2. Set glass lites centered in openings on setting blocks.
  - 3. Install removable stops, and insert dense compression gaskets at corners, working toward centers of lites, compressing glass against soft compression gaskets and to produce a weathertight seal. Seal joints in gaskets. Allow gaskets to protrude past face of glazing stops.

3.04 MIRRORS

- A. Install mirrors in accordance with manufacturer's instructions using concealed fastenings.

3.05 PROTECTION

- A. Protect installed glass from damage during construction. Attach streamers or warning tape to framing members, away from contact with glass. Remove nonpermanent labels.
- B. Protect installed glass from contact with contaminating substances during construction. Immediately clean glass exposed to contamination using methods recommended by glass manufacturer.
- C. Within 5 working days prior to inspection for Substantial Completion, clean all exposed glass surfaces using methods recommended by manufacturer. Remove glazing compounds from framing surfaces.
- D. Remove and replace broken or damaged glass.

END OF SECTION

**GLASS-MAT FACED GYPSUM BACKING BOARDS**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide fiberglass-mat faced moisture resistant gypsum backer board where shown on the Drawings or as specified herein and as needed for a complete and proper installation.
  - B. Related work:
    - 1. Section 09 29 00: Gypsum Board.
    - 2. Section 09 30 13: Ceramic Tiling.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- 1.03 REFERENCES
  - A. ANSI A118.4: Modified Dry-Set Mortar.
  - B. ASTM C627: Standard Test method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
  - C. ASTM C840: Standard Specification for Application and Finishing of Gypsum Board.
  - D. ASTM C1002: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - E. ASTM C1178: Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
  - F. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  - G. ASTM D6329: Standard Guide for Developing Methodology for Evaluating the Ability of Indoor materials to Support Microbial Growth Using Static Environmental Chambers.
  - H. ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
  - I. TCNA: Handbook for Ceramic Tile Installation.
- 1.04 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
  - B. Certify that material meets specified requirements and fire resistance ratings indicated.
  - C. Standards:
    - 1. Prepare tile backer board surface in accordance with the following methods described in current edition of the Handbook for Ceramic Tile Installation:
      - a. Walls and base: W242 Organic Adhesive.
- 1.05 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
  - B. Delivery: Deliver materials to the job site in manufacturer's original packaging, containers and bundles with manufacturer's labels intact.
  - C. Storage and Handling: Store and handle materials to protect against contact with damp and wet surfaces, exposure to weather, breakage and damage to edges. Provide air circulation under covering and around stacks of materials.
- 1.06 WARRANTY
  - A. Provide manufacturer's standard 20 YR warranty against manufacturing defects and deterioration or delamination as a result of normal use conditions, including the presence of moisture.



## 2.0 PRODUCTS

### 2.01 BACKER BOARD

- A. Provide Type X glass-mat faced gypsum backer board complying with ASTM C1178 and with the following attributes:
1. Size: 4 FT x 8 FT x 5/8 IN thick.
  2. Edges: Square.
  3. Surfacing: Coated fiberglass mat on face, back and long edges.
  4. Mold resistance: Not less than 10 per ASTM D3273.
  5. Microbial resistance: Will not support microbial growth per ASTM D6329.
  6. Permeance: Not more than 1.0 perms when tiled per ASTM E96.
  7. Robinson floor test rating: Light Commercial per ASTM C627.
  8. Location:
    - a. Wet walls in:
      - 1) UA RR 104.
      - 2) Men's Lav 143 & Men's RR 144.
      - 3) Women's Lav 145 & Women's RR 146.
    - b. Corridor 102: 3 walls at drinking fountain alcove.
    - c. Corridor 153: 3 walls at drinking fountain alcove.
- B. Acceptable products:
1. "DensShield Fireguard Tile Backer" as manufactured by Georgia-Pacific Corporation, Tel. 800-231-6060, Web [www.buildgpc.com](http://www.buildgpc.com), distributed by Longhorn Building Supply, Frisco, Texas.
  2. Equal products of other manufacturers approved in advance by the Architect.

### 2.02 JOINT TREATMENT MATERIALS

- A. Joint tape: Provide 2 IN wide, 10 x 10 fiberglass mesh tape equal to G-P DensShield Joint Tape.
- B. Joint compound: Provide latex Portland cement mortar complying with ANSI A118.4.

### 2.03 OTHER MATERIALS

- A. Screws: Provide MIN 1-1/4 IN long, Type S or S-12 bugle head screws, self-tapping and corrosion-resistant as recommended by backer board manufacturer for particular installation and complying with ASTM C1002.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
1. Steel studs should be spaced 16 IN OC MAX.
  2. Steel studs should be 20 gage MIN.
- B. General:
1. Install backer board vertically or horizontally on metal studs in accordance with ASTM C840, manufacturer's recommendations, and the Handbook for Ceramic Tile Installations.
  2. Use MAX lengths possible to minimize number of joints. Locate edge joints parallel to and on framing. Stagger intermediate end joints of adjacent lengths of backer board. Cut panel to required size and make cutouts. Closely fit ends and edges.

3. Attach backer board to framing with fasteners recommended by backer board manufacturer, spaced 6 IN OC, with grey, coated face away from studs. Drive fasteners flush with coated surface; do not countersink.
  4. Maintain 1/8 IN MIN gap between backer board and tub deck, preformed shower pan, or shower pan membrane, and fill gap with flexible sealant.
  5. Apply fiberglass mesh tape at all panel joints and corners and embed in a skim coat of joint compound. Calk corners and edges prior to addition of fiberglass mesh tape. Seal penetrations and abutments to dissimilar materials.
  6. Locate control and expansion joints at same locations as substrate, and where required by finishes.
    - a. Walls: Expansion joints not to exceed every 30 LF of continuous wall.
    - b. Ceilings: Expansion joints not to exceed every 30 FT of continuous ceiling surface without perimeter relief or 900 SF MAX.
- C. Finishing:
1. Substrate for ceramic tile: Apply glass mesh joint tape over joints and corners. Embed tape in joint compound. Fill joints in accordance with backer board and ceramic tile manufacturer's recommendations. Allow joints to dry prior to installing ceramic tile systems.
  2. Substrate for FRP panels: Apply glass mesh joint tape over joints and corners. Embed tape in joint compound. Fill joints in accordance with backer board and FRP panel manufacturer's recommendations. Allow joints to dry prior to installing FRP panels.

### 3.03 PROTECTION

- A. Protect backer board installations from damage and deterioration prior to installation of scheduled wall finish materials.

END OF SECTION

**09 29 00**  
**GYP SUM BOARD**

1.0 GENERAL

1.01 SUMMARY

- A. Provide metal studs, gypsum board and accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 05 41 00: Structural Metal Stud Framing.
  - 2. Section 07 84 00: Firestopping.
  - 3. Section 07 92 00: Joint Sealants.
  - 4. Section 09 28 16: Glass-Mat Faced Gypsum Backing Boards.
  - 5. Section 09 91 00: Painting: Wall texture.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Materials list of items proposed to be provided under this Section.
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 3. Manufacturer's instructions regarding applicable temperature and humidity ranges, special procedures, and perimeter conditions requiring special attention.

1.03 REFERENCES

- A. ASTM A780: Standard Practice for Repair of Damaged Hot-Dipped Galvanized Coatings.
- B. ASTM C475: Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- C. ASTM C645: Standard Specification for Nonstructural Steel Framing Members.
- D. ASTM C754: Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- E. ASTM C840: Standard Specification for Application and Finishing of Gypsum Board.
- F. ASTM C919: Standard Practice for Use of Sealants in Acoustical Applications.
- G. ASTM C954: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs.
- H. ASTM C1002: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- I. ASTM C1396: Standard Specification for Gypsum Board.
- J. GA-216: Recommended Specifications for the Application and Finishing of Gypsum Board.
- K. GA-600: Fire Resistance Design Manual.
- L. SSPC-Paint 20: Specification for Zinc-Rich Primers.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Single source responsibility: Except where specified otherwise, obtain gypsum board products, trim, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver materials to site promptly without undue exposure to weather.
- C. Deliver materials in manufacturer's original unopened containers or bundles, fully identified with name, brand, type and grade.
- D. Store materials above ground in dry, ventilated space.

- E. Protect materials against soiling or damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Remove wet gypsum board from Project site.
- F. Store and support gypsum board in flat stacks to prevent sagging.
- G. Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads and trim.

## 1.06 PROJECT CONDITIONS

- A. In cold weather, the building should be heated to maintain a uniform temperature in the range of 50°F to 70°F for 48 HRS prior to commencing the application of the gypsum board and joint treatment, and until joint and finishing compounds have dried thoroughly.
- B. Ventilate building spaces to remove moisture in excess of that required for drying joint treatment materials after its application. Avoid drafts during hot, dry weather to prevent materials from drying too rapidly.

## 2.0 PRODUCTS

### 2.01 GYPSUM WALLBOARD AND ACCESSORIES

- A. General:
  - 1. Provide products and materials manufactured by United States Gypsum Company, Dallas, Texas, Tel. 214-490-0771, or equal products of other manufacturers approved in advance by the Architect.
  - 2. Provide 5/8 IN thick gypsum board in 48 IN widths and MAX available lengths to minimize end-to-end butt joints, with tapered edges and square cut ends, complying with ASTM C1396.
- B. Gypsum board:
  - 1. Gypsum board: Provide 5/8 IN thick wallboard.
  - 2. Fire-retardant gypsum board: Provide 5/8 IN thick Firecode Core Type X Wallboard complying with ASTM C36 where required by code.
  - 2. Moisture and mold-resistant gypsum board: Provide 5/8 IN thick moisture- and mold-resistant gypsum core wallboard complying with ASTM C630 on all walls in restrooms and janitor's closets except as specified in Section 09 28 16.
- C. Accessories:
  - 1. Fastening devices:
    - a. Self-drilling, self-tapping, bugle head screws complying with ASTM C954 and ASTM C1002, length to suit application, cadmium plated for exterior locations.
    - b. Type S screws for 21 to 26 gage metal framing and furring.
    - c. Type S-12 screws for 12 to 20 gage metal framing and furring.
    - d. Type G screws for gypsum board to gypsum board.
    - e. Type W screws for wood framing; nails not permitted.
  - 2. Casing Bead: Provide USG 200 Series.
  - 3. Control Joints: Provide USG No. 093 zinc control joint.
  - 4. Corner Bead: Provide USG 100 Series Dur-A-Bead.
  - 5. Compressible filler: 3.5 PCF mineral wool insulation, compressed to 7.0 PCF MIN.

### 2.02 METAL STUDS AND ACCESSORIES

- A. General:
  - 1. Provide C-shaped studs, channel shaped runners, and furring channels complying with ASTM C645.
  - 2. Provide with galvanized coating complying with ASTM A525, G40 thickness unless otherwise specified; rolled channels used in ceilings may be finished with manufacturer's standard rust inhibitive paint.
  - 3. At exterior walls and showers, provide galvanized coating with G60 thickness.
  - 4. Provide bracing members of same size as studs.
- B. At all interior partitions unless otherwise specified below or noted on the Drawings, provide 3-5/8 IN x 25 gage standard punched steel studs.

- C. At all interior partitions that extend to second floor deck, are scheduled to receive ceramic tile or FRP panels, or noted on the Drawings, provide 3-5/8 IN x 20 gage standard punched steel studs.
- D. At interior wall furrings adjacent to structural columns and roof drain piping, provide 2-1/2 IN or 3-5/8 IN x 25 gage standard punched steel studs.
- E. At all interior metal stud framed openings, provide 3-5/8 IN or 6 IN x 20 gage standard punched steel studs, double studs at jambs, boxed stud headers at openings greater than 40 IN wide.
- F. Wall stud runners: Provide channel shaped members with 1-1/4 IN flanges, solid web, and same sheet metal thickness as wall studs.
- G. Extended leg ceiling runners: Provide channel shaped members, with MIN 2 IN flanges, solid web, and same sheet metal thickness as wall studs.
- H. Accessories, plates, gussets, clips: Provide formed sheet steel, thickness as indicated on the Drawings or determined for conditions encountered; same finish as framing members.
- I. Fasteners:
  - 1. Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved.
  - 2. Comply with the gypsum board manufacturer requirements for indicated applications.

#### 2.03 JOINTING SYSTEM

- A. Provide a jointing system, including paper reinforcing tape and ready-mixed joint compound complying with ASTM C475, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum board approved for use on this Work.
- B. Jointing compound:
  - 1. Compounds specifically manufactured for topping coats are not permitted for first coat on metal trim and taping.
  - 2. Mix compounds in strict accordance with manufacturer's directions.
  - 3. Mix only enough compound at one time to be used during recommended pot life.

#### 2.04 OTHER MATERIALS

- A. Backer plates:
  - 1. Type: 14 gage uncoated metal thickness steel sheet, galvanized in accordance with ASTM A525 G60.
  - 2. Length: Sufficient to extend to nearest studs beyond MAX dimension of attached item and engage fasteners from attached item; span 3 studs MIN.
  - 3. Height: 6 IN MIN or higher where required to accommodate item being fastened.
  - 4. When manufacturer of attached item has more rigorous mounting plate requirements, comply with manufacturer's requirements.
- B. Provide acoustical sealant for concealed locations equal to BA-98 Acoustical Sealant as manufactured by Pecora Corporation, and with the following attributes:
  - 1. Non-hardening, non-drying, non-skinning, non-staining, non-bleeding, non-sag synthetic rubber.
  - 2. Capable of maintaining air-tight seal.
  - 3. For use in concealed locations not exposed to view.
  - 4. Specifically manufactured as acoustical sealant.
- C. Galvanizing touchup paint: Provide paint complying with ASTM A780 and SSPC-Paint 20 equal to ZRC Galvilite Galvanizing Repair, ZRC Cold Galvanizing Compound or ZRC Low VOC Cold Galvanizing Compound.
- D. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify rough-in utilities and blocking are in proper position.

#### 3.02 PREPARATION

- A. Items which require backer plates or blocking:
  - 1. Coordinate sizes and locations.
  - 2. Install additional studs for attachment of backer plates and blocking in required locations to receive surface mounted accessories as indicated or as required by accessory manufacturer.
  - 3. Elimination of backer plates and blocking is not permitted.
  - 4. Direct attachment of items to studs is not permitted.

#### 3.03 FRAMING INSTALLATION

- A. General:
  - 1. Install framing in accordance with ASTM C754, manufacturer's printed instructions, the Drawings, local authorities having jurisdiction, and with requirements of ASTM C840 that apply to framing installation, except for more stringent requirements of these Specifications.
  - 2. Accurately layout partition and wall lines from the dimensions shown on the Drawings.
  - 3. Install framing plumb, level, square, and free from warp and twist while maintaining dimensional tolerances and alignment with surrounding construction.
  - 4. At interior partitions indicated on the Drawings to receive batt insulation, install acoustical sealant in accordance with manufacturer's instructions and ASTM C919.
    - a. Place one bead continuously on substrate before installation of perimeter framing members.
    - b. Place continuous bead at perimeter of each layer of gypsum board.
    - c. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.
  - 5. Touchup damaged galvanized surfaces with touchup paint.
- B. Studs and runners:
  - 1. Stud spacing: Unless otherwise indicated, provide studs spaced 16 IN OC.
  - 2. Runner tracks: Provide continuous tracks sized to match studs.
  - 3. Terminate top of partitions approximately 6 IN above ceiling construction and brace to structure unless otherwise indicated.
  - 4. Where partitions are indicated to extend to roof deck, to prevent deflection transfer of structural loads or movements to partitions, provide slip joint between partition and structure using top runner nested within 3 IN long segment of extended leg ceiling runner positioned at stud spacing (or continuous extended leg ceiling runner) and fastened to overhead surface. Do not fasten top runner to extended leg ceiling runner.
  - 5. Horizontally align openings in stud webs.
  - 6. Use full length studs vertically positioned between runner tracks.
  - 7. MIN framing at openings:
    - a. Provide two 20 gage studs at each jamb.
    - b. Provide one additional stud not more than 6 IN from jamb studs.
    - c. Provide wall framing above and below openings to match wall framing adjoining the opening. Above door openings, provide cut-to-length studs adjacent to full-height jamb studs at each jamb.
    - d. At welded frames with fixed anchor clips, secure studs to jamb anchor clips with not less than two self tapping screws per clip.

- e. Above welded frames, provide a horizontal cut-to-length section of runner track with a web-flange bend at each end, securely screw attached to the adjacent vertical studs. Provide built-up header composed of two horizontal boxed studs and additional runner tracks as required by width of opening to support weight of partition above opening.
  - 8. Fabricate corners with a MIN of three studs.
  - 9. Provide additional studs and framing to support wall intersections, termination of walls, at openings and cut-outs and to support built-in anchorage and attachment devices for other work.
  - 10. Locate studs no more than 2 IN from abutting walls, wall corners and other construction. Start typical wall studs 6 IN either side of stud reinforcing or frames.
  - 11. Install steel studs so that flanges point in the same direction and so that leading edges or ends of gypsum board can be attached to open (unsupported) edges of stud flanges first.
- C. Backer plates:
- 1. Provide backer plate for securing surface mounted fittings, fixtures, accessories, and furnishings, including, but not limited to handrails, grab bars, toilet partitions, towel bars, wall mounted door stops, bumper guards, and similar screw- and bolt-fastened items.
  - 2. Secure with sufficient quantity of self-tapping sheet metal screws to sustain loads imposed by items attached to backer plates.
- D. Blocking: Coordinate with Section 06 10 00 for installation of concealed wood blocking and furring required for securing wood trim, carpentry, woodwork, cabinets, millwork, casework, surface mounted equipment, and similar nail-fastened items.

### 3.04 GYPSUM BOARD INSTALLATION

- A. General:
- 1. Install gypsum board in accordance with ASTM C840, manufacturer's instructions, the Drawings and these Specifications. MAX variation of finished gypsum board surface from true flatness shall be 1/8 IN in 10 FT in any direction.
  - 2. Install gypsum board in accordance with GA-216, GA-600 for fire-rated assemblies.
  - 3. Install gypsum board with face side out.
  - 4. Use boards of maximum length to minimize end joints.
  - 5. Abut boards without forcing; neatly fit ends and edges of board with gap between adjacent panels no greater than 1/16 IN.
  - 6. Position boards so that like edges abut; tapered edges against tapered edges and field-cut or mill-cut edges against field-cut or mill-cut edges.
  - 7. Hold bottom of board 1/4 IN above floor.
  - 8. Support ends and edges of board directly on framing or furring members.
  - 9. Joint staggering:
    - a. Ceilings: Stagger end joints not less than one framing member.
    - b. Walls: Stagger vertical joints on opposite side of walls to occur on alternate framing members.
    - c. Fire-rated assemblies: Comply with fire-rated assembly design requirements for joint staggering.
    - d. Bullet-resistant walls: Stagger vertical joints in gypsum wall board with vertical joints in bullet-resistant panels immediately behind gypsum wall board.
  - 10. Do not locate gypsum board joints within 12 IN of external corners of windows, doors, or other such openings, except when control joints are installed at corners.
  - 11. Cut openings in board with no greater than 1/4 IN gap around electrical outlets, plumbing, light fixtures, piping and other similar penetration items and small enough to be covered by plates and escutcheons; coordinate size of gap around penetrations in fire-rated assemblies with firestop requirements of Section 07 84 00.
  - 12. Do not install imperfect, damaged, or damp boards.

13. In concealed spaces above ceilings where designated walls extend full height to structure above, install boards in full coverage on both faces of framing system for fire, sound, air, and smoke-rated walls.
  14. Fit gypsum board around ducts, pipes, and conduits.
  15. Where walls intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum board to fit profile formed by structural member; allow 1/4 to 1/2 IN wide joints to install sealant.
  16. In concealed spaces and chase walls where gypsum board occurs on outside face of walls only, fasten horizontal studs or 1-1/2 IN wide 20 gage galvanized steel straps to inside face of studs spaced 36 IN OC vertically with top strap no more than 6 IN from top of wall to prevent stud rotation.
  17. Attach gypsum board to steel studs so that leading edge or end of each board is attached to open (unsupported) edges of stud flanges first.
  18. Attach gypsum board to framing provided at openings and cutouts.
  19. Terminate gypsum board on each side of control and expansion joints.
- B. Fasteners:
1. Attachment methods:
    - a. Attach gypsum board to framing and furring with screws.
    - b. Attach gypsum board to gypsum board with screws.
    - c. Attach gypsum board to bullet-resistant panels with screws.
  2. Except where indicated otherwise or required for fire rated assemblies, space fasteners in compliance with more restrictive requirements of referenced installation standard or manufacturer's requirements.
  3. Attach board to supplementary framing and blocking which provide additional support at openings and cutouts.
- C. Ceilings: Place gypsum board with long edge perpendicular to orientation of framing or furring members.
- D. Walls: Install gypsum board vertically in manner which will minimize end-butt joints, unless specific orientation is required by fire-rating design.

### 3.05 METAL TRIM

- A. General:
1. Install trim flush using longest practical length; miter corners and intersections.
  2. Fasten flanges by screws, stapling, or clinching in accordance with manufacturer's instructions.
- B. Install casing beads where edge of gypsum board would be exposed or semi-exposed and where gypsum board abuts dissimilar materials.
- C. Install corner beads at visually-exposed external corners, unless otherwise indicated.
- D. Control joints: Coordinate placement and locations with Architect prior to commencement of work. Install control joints in accordance with the following:
1. Locate at joints of MAX stress, at points of natural weak planes, such as at openings, changes in back-up material, and at corners of offsets in walls exceeding 30 FT in length.
  2. In interior partitions at 30 FT OC MAX.
  3. In exterior partitions at 20 FT OC MAX.
  4. Extend control joints from both corners of door frames to top of wall, vertically aligned with the outer edge of the frame.
  5. Extend control joints from both corners of window frames to top of wall and bottom of wall, vertically aligned with the outer edge of the frame.
  6. Where gypsum board is vertically continuous, as at stairwells and other long vertical wall areas, provide horizontal control joints at each floor level.
  7. Locate in ceilings with area exceeding 900 SF, where framing or furring changes direction, and spaced apart not more than 30 FT.
- E. Other metal trim:
1. The Drawings do not purport to show all locations and requirements for metal trim.
  2. Carefully study the Drawings and the installation and provide all metal trim normally recommended by the manufacturer of the gypsum board approved for use in this Work.



### 3.06 JOINT TREATMENT

- A. General:
  - 1. Inspect areas to be joint treated, verifying that the gypsum board fits snugly against supporting framework.
  - 2. Apply joint treatment to gypsum board joints (both directions); flanges of corner beads, casing beads, and control joints; penetrations; fasteners; surface defects; and elsewhere to prepare surfaces for finishes indicated.
  - 3. Comply with manufacturer requirements for hardening and drying of joint treatment prior to application of succeeding coats.
- B. Internal corners: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.
- C. Embedding compounds:
  - 1. Apply to gypsum board joints and fastener heads in a thin uniform layer.
  - 2. Spread the compound not less than 3 IN wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Reinforcing tape shall be properly folded at interior corners and angles to provide a true angle. Then spread a thin layer of compound over the tape.
  - 3. After the treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading a thin uniform coat of sufficient width to fill the board taper and feather edge.
  - 4. Sandpaper between coats as required.
  - 5. When thoroughly dry, sandpaper to eliminate ridges and high points.
- D. Finishing compounds:
  - 1. After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.
  - 2. Feather the finishing compound to not less than 12 IN wide.
  - 3. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the gypsum board.

### 3.07 ADJUSTING

- A. Adjust and align metal framing to properly receive final finishes in accordance with required tolerances.
- B. Correct damages, defects, and leave work ready for decoration. Clean compounds from trim. Visible cracks, nail heads, tool marks, waves, distortions, or other similar defects shall not appear in finished work.

### 3.08 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
- B. Promptly remove joint compound from surfaces not intended to receive compound.

### 3.09 PROTECTION

- A. Protect finished work.
- B. Protect metal framing so that it will be without any evidence of damage which would be detrimental to finished work.

END OF SECTION

**09 30 13**  
**CERAMIC TILING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide ceramic tile and finishing/edge protection where scheduled on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 09 28 16: Glass-Mat Faced Gypsum Backing Boards.
  - 2. Section 09 29 00: Gypsum Board.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Samples of tile in the full range of colors available from the proposed manufacturer in the specified size and texture.
  - 2. Samples of grout in the full range of colors available from the proposed manufacturer in the specified grades.
  - 3. Samples of finishing and edge protection from the proposed manufacturer in the specified size, finish and profile.
- C. Maintenance data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Maintain 1 copy of "2019 Handbook for Ceramic, Glass and Stone Tile Installation" published by the Tile Council of North America, Inc. (TCNA) and ANSI A108 Series/A118 Series on site.
- C. Materials shall be identified on the package with manufacturer's name, type of material, grade and color.
- D. Standards:
  - 1. Prepare surface, set, grout and clean tile in accordance with the following methods described in current edition of the Handbook for Ceramic Tile Installation published by the Tile Council of America, Inc.:
    - a. Walls: W242 Wood studs, gypsum board, organic adhesive.
    - b. Walls: W245 Wood studs, glass mat faced gypsum backer boards.
    - c. Floors (all floors scheduled unless noted): F113 Concrete subfloor - Latex-Portland cement mortar.
  - 2. Work shall be executed and tested in accordance with current editions of the following standards:
    - a. ANSI A108.1A: Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar.
    - b. ANSI A108.4: Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive.
    - c. ANSI A108.5: Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
    - d. ANSI A108.6: Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy.
    - e. ANSI A108.10: Installation of Grout in Tilework.
    - f. ANSI A108.11: Interior Installation of Cementitious Backer Units.
    - g. ANSI A118.1: Dry-Set Cement Mortar.
    - h. ANSI A118.4: Latex-Portland Cement Mortar.
    - i. ANSI A118.6: Standard Cement Grouts for Tile Installation.
    - j. ANSI A136.1: Organic Adhesives for Installation of Ceramic Tile.
    - k. ASTM C150: Specifications for Portland Cement.
    - l. ASTM C206: Specifications for Finishing Hydrated Lime.

3. Ceramic tile shall comply with current edition of ANSI A137.1: Standard Specifications for Ceramic Tile.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver to job site and store packaged material in original containers with labels intact.
- C. Prevent damage to materials by water, freezing, or other causes.
- D. Store materials in a dry, warm, ventilated, weathertight location.

#### 1.05 PROJECT CONDITIONS

- A. Maintain temperatures at not less than 50°F in tiled areas during installation, and for 7 days after completion unless higher temperatures are required by manufacturer's instructions.
- B. Protection:
  1. Protect adjacent surfaces during progress of the work of this Section.
  2. Close rooms and spaces to traffic of all types until mortar and grout have set for 72 HRS.
- C. Observe the manufacturer's recommended safety precautions, including those pertaining to ventilation.
- D. Illuminate the work area during installation, providing the same level and angle of illumination as will be available for final inspection.

#### 1.06 EXTRA STOCK

- A. At completion of the project, deliver to the Owner an extra stock of tile and trim shapes of each type, color, pattern, and size used in the work of this Section, at the rate of approximately 5% of the amount used in the Work, packaging material securely to prevent damage, and clearly labeled.

### 2.0 PRODUCTS

#### 2.01 CERAMIC TILE

- A. Provide ceramic tile where scheduled on the Drawings, in the following selections and colors:
- B. Provide standard trim shapes as required.
  1. Provide all caps, stops, returns, trimmers, and other shapes indicated or required to produce a completely finished installation.
  2. Except as may be shown otherwise on the Drawings, provide color and finish matching the adjacent tile.
- C. CT-1 Glazed Porcelain tile (all floors and walls scheduled unless noted otherwise):
  1. Manufacturer: Dal-Tile.
  2. Product: Cotto Contempo, 13 IN x 13 IN x 5/16 IN.
  3. Color: CC15 Sunset Blvd.
  4. Base units: Provide cove base tile in matching color; size 6 IN x 13 IN (where wall finish scheduled is NOT ceramic tile).
- D. CT-2 Glazed Porcelain tile (match existing 1st floor corridor floors to remain):
  1. Manufacturer: Dal-Tile.
  2. Product: Harmonist Colorbody Porcelain, Matte finish, 12 IN x 12 IN x 5/16 IN unless noted.
  3. Color:
    - a. Primary tile: HM24 Ambiance.
    - b. Accent tile: HM27 Promise.
    - c. Diamond accent tile: HM32 Amity (6 IN x 6 IN cut from full tile).
  4. Base units: Provide bullnose in color matching primary tile; size 4 IN x 12 IN.

#### 2.02 SETTING MATERIALS

- A. Comply with pertinent recommendations contained in the current edition of the Tile Council of America "Handbook for Ceramic Tile Installation".

- B. Dry-set mortar:
    1. Provide a commercially prepared mixture of Portland cement, sand, and additives imparting water-retentivity, for use as a bond coat for setting tile.
    2. Comply with ANSI A118.1.
  - C. Latex-Portland cement mortar:
    1. Provide a commercially prepared mixture of Portland cement, sand, and special latex additive for use as a bond coat for setting tile.
    2. Comply with ANSI A118.4.
  - D. Organic Adhesive for wall and base tile:
    1. Provide a prepared organic material, ready to use with no further addition of liquid or powder, which cures or sets by evaporation.
    2. Comply with ANSI A136.1.
- 2.03 GROUT
- A. Provide grout in colors selected by the Architect from standard colors available from the approved manufacturers.
    1. Main Corridors & Elevator Lobby: Match Custom Truffle #540.
    2. All Restrooms: Match Custom Coffee Bean #646.
  - B. Provide grout complying with ANSI A118.6 appropriate to each type of ceramic tile used and type of exposure.
- 2.04 SEALANT
- A. Provide sealant as recommended by tile manufacturer in colors selected by the Architect from standard colors available from the approved manufacturers.
- 2.05 FINISHING AND EDGE PROTECTION
- A. Approved manufacturer: Schluter Systems, LP, Plattsburgh, NY, Tel. 800-472-4588, Web [www.schluter.com](http://www.schluter.com).
  - B. Exposed edge and exterior corner wall trim: QUADDEC.
    1. Description: Profile with square visible surface, integrated trapezoid-perforated anchoring leg and integrated grout joint spacer.
    2. Corners: Provide with matching inside and outside corners and internal connectors.
    3. Material and finish: ABGB – brushed antique bronze anodized aluminum.
    4. Height: 1/4, 5/16 or 3/8 IN as required for specific ceramic tile.
  - C. Sloped transition floor trim: RENO-U.
    1. Description: Profile with sloped exposed surface, 5/32 IN tall leading edge, integrated trapezoid-perforated anchoring leg and integrated grout joint spacer.
    2. Material and finish: ABGB – brushed antique bronze anodized aluminum.
    3. Height: 1/4, 5/16 or 3/8 IN as required for specific ceramic tile.
- 2.06 OTHER MATERIALS
- A. Grout sealer: Provide 'Aquamix' as manufactured by Dal-Tile or equal products of other manufacturers approved in advance by the Architect.
  - B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
  - B. Coordinate with other trades as needed to assure that proper substrata are provided to receive the work of this Section.
  - C. Condition of surfaces to receive tile:
    1. Verify that grounds, anchors, plugs, recess frames, bucks, electrical work, mechanical work, and similar items in or behind the tile have been installed before proceeding with installation of mortar bed or tile.

2. Verify that surfaces to receive mortar setting bed and tile are firm, dry, clean, and free from oily or waxy films and curing compounds.
3. Concrete slabs shall be clean and free of films which may prevent bonding of mortar. Verify that concrete slabs are ready for tile installation by testing for moisture emission rate and alkalinity.
4. Wall surfaces in toilets scheduled to receive tile shall be moisture and mold-resistant gypsum board with taped and bedded joints. Seal surface of taped joints. Prime entire surface in accordance with adhesive manufacturer's recommendation.
5. Wall surfaces in showers scheduled to receive tile shall be backer board with taped and bedded joints. Seal surface of taped joints. Prime entire surface in accordance with adhesive manufacturer's recommendation.

### 3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces.
- C. Seal substrate surface cracks with filler. Level substrate surfaces to acceptable flatness tolerances.
- D. Ensure backer board has been installed in accordance with pertinent provisions of ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.

### 3.03 INSTALLATION-FINISH AND EDGE PROTECTION

- A. Install finish and edge protection in accordance with manufacturer's instructions.

### 3.04 INSTALLATION-GENERAL

- A. General:
  1. Install tile, grout and thresholds in accordance with pertinent provisions of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
  2. Maintain minimum temperature limits and installation practices recommended by materials manufacturers.
  3. Mix and use proprietary materials in strict accordance with the manufacturers' printed instructions.
  4. Sound tile after setting. Replace hollow sounding units.
  5. Provide tile surfaces clean and free from cracked, chipped, broken, unbonded and otherwise defective units.
  6. Allow tile to set MIN 48 HRS prior to grouting.
- B. Limits of tile:
  1. Extend tile into recesses, under and behind equipment and fixtures to form a complete covering without interruptions.
  2. Cut and fit tile to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile; leave sealant joint space around penetration.
  3. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment.
  4. Form internal angles square and external angles bullnosed.
- C. Joining pattern:
  1. Lay tile in grid pattern unless otherwise indicated on the Drawings or directed by the Architect. Do not interrupt tile pattern through openings.
  2. Align joints when adjoining tiles on base, trim, and walls are the same size.
  3. Layout tile work and center the tile fields both directions in each space or on each wall area.
  4. Lay out tiles so that all cut tiles occur at inside corners where possible.
  5. Adjust to minimize tile cutting.
  6. Provide uniform joint widths, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
  7. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

- D. Provide expansion and control joints where recommended by the current edition of the TCA Handbook.
    - 1. Verify exact locations of joints with the Architect prior to beginning the work of this Section.
  - E. Grout tile to comply with referenced installation standards using grout materials specified.
  - F. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- 3.05 INSTALLATION-FLOOR TILE
- A. Install floor tile in accordance with TCA Handbook Method F111 (showers) or F113 (all other floors scheduled).
- 3.06 INSTALLATION-WALL TILE
- A. Install wall tile in accordance with TCA Handbook Method W242 over gypsum board or W245 over glass mat faced gypsum backer board (see Section 09 28 16).
- 3.07 INSTALLATION-GROUT SEALER
- A. Seal cementitious grout in floor tile joints with grout sealer in accordance with manufacturer's instructions.
  - B. Remove excess sealer from tile surfaces.
- 3.08 CLEANING
- A. Upon completion of placing and grouting, clean the work of this Section in accordance with recommendations of the manufacturers of the materials used.
  - B. Protect metal surfaces, cast iron, and vitreous items from effects of acid cleaning.
  - C. Flush surfaces with clean water before and after cleaning.
- 3.09 PROTECTION
- A. Provide required protection of tile surfaces to prevent damage and wear prior to acceptance of Work by the Owner.

END OF SECTION

**09 51 00**  
**ACOUSTICAL CEILINGS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide acoustical ceilings with exposed suspension systems where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 09 29 00: Gypsum Board: Gypsum board suspended ceiling systems.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Samples of each type of acoustical material and metal suspension system for approval of the Architect.

1.03 REFERENCES

- A. ASTM C635: Standard Specification for the Manufacture, Performance, and Testing of metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- B. ASTM C636: Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- C. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ASTM E1264: Standard Classification for Acoustical Ceiling Products.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Installer qualifications: Installer shall have 3 YRS MIN of successful experience in the installation of suspended ceiling systems on projects of similar size and complexity.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery: Deliver materials in original unopened packages, clearly labeled with manufacturer's name, item description, specification number, type, and class as applicable.
- C. Inspection: Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement materials as required. Any damaged materials shall be promptly removed from the job site.
- D. Storage and protection: Store in manner that will prevent warpage, water damage, or damage of any kind. Prevent interference to/by other trades and any other adverse job conditions due to storage locations or methods.
- E. Handling: Handle in such a manner as to ensure against racking, distortion, or physical damage of any kind.

1.06 PROJECT CONDITIONS

- 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.
- B. Locate materials onsite at least 24 HRS before beginning installation to allow materials to reach temperature and moisture content equilibrium.
- C. Maintain uniform temperature of 60-75°F and relative humidity of 65-75% 24 HRS prior to, during and after acoustical unit installation.

- 1.07 WARRANTY
- A. Provide manufacturer's standard 10 YR panel/15 YR system warranty against sagging due to moisture contact and relative humidity up to 100%.
- 1.08 EXTRA STOCK
- A. At completion of the project, deliver to the Owner an extra stock of approximately 5% of each acoustical material installed under this Section, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.
- 2.0 PRODUCTS
- 2.01 "T" GRID SUSPENSION SYSTEM
- A. Provide a complete system of main runners, cross tees, placement tees, wall angles, clips, splices and accessories of every type required for a complete suspended "T" grid system of the arrangements shown on the Drawings. System shall be manufactured of cold roll steel, electrozinc coated, conforming to heavy duty classification of ASTM C635. Exposed surfaces shall be factory painted in manufacturer's standard LoGloss White.
- B. Acceptable products:
1. USG Interiors, Inc. "Donn DX", Web [www.usg.com](http://www.usg.com).
  2. Equal products of other manufacturers approved in advance by the Architect.
- 2.02 ACOUSTICAL CEILING PANELS
- A. Provide lay-in acoustical ceiling panels where scheduled on the Drawings and with the following attributes:
1. Material: Mineral fiber, wet-formed.
  2. Texture: Medium, directional.
  3. Pattern: Unscored.
  4. Dimensions: 24 IN x 24 IN x 5/8 IN.
  5. Edge: Square.
  6. NRC: 0.55.
  7. CAC: 30.
  8. Fire resistance/flammability: Class A (UL).
  9. Light Reflectance: 0.81.
  10. Humidity resistance: Standard.
  11. ASTM E1264 classification: Type III, Form 2, Pattern CD.
- B. Acceptable products:
1. Armstrong, '756 Fissured', Web [www.armstrong.com](http://www.armstrong.com).
  2. Substitutions will not be approved as selection is part of an Owner adopted Material Selections Building Standard.
- 2.03 OTHER MATERIALS
- A. Hanger wire: 12 gage galvanized steel wire.
- B. Support channels and hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- C. Touch-up paint: Type and color to match acoustical and grid units.
- D. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 3.0 EXECUTION
- 3.01 SURFACE CONDITIONS
- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine substrates and structural framing to which ceiling systems attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of ceiling systems.



- C. Verify work above ceiling system is complete and installed in manner that will not affect layout and installation of system components.

### 3.02 INSTALLATION-SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and manufacturer's instructions to pattern indicated on drawings.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling.
- C. Install hanger plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
- D. Where widths of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- E. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
- F. Space hangers not more than 4 FT OC along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 IN from ends of each member.
- G. Install additional hangers at light fixtures, A.C. grilles and other ceiling accessories within 6 IN of each corner, or support components individually. MAX deflection shall be limited to 1/360 of the span.
- H. Install edge moldings at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
- I. Screw-attach moldings to substrate at intervals not over 16 IN OC and not more than 3 IN from ends, leveling with ceiling suspension system.
  - 1. Use longest practical lengths.
  - 2. Miter corners.
- J. Make all grid level within a tolerance of one in 1000 and straight within a tolerance of one in 1000.

### 3.03 INSTALLATION-ACOUSTICAL UNITS

- A. Install panels in accordance with instructions and recommendations of the ceiling system manufacturer.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Install lay-in panels in grid system with grain of pattern (if any) in same direction.
- D. Scribe and cut panels to fit accurately at borders and penetrations. All edges of panels shall be supported by suspension system.
- E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.
- F. Install acoustical units only after above-ceiling work is complete.
- G. Install hold-down clips for acoustical panels only when so required by governmental agencies having jurisdiction; space as recommended by panel manufacturer.

### 3.04 ERECTION TOLERANCES

- A. MAX variation from flat and level Surface: 1/8 IN in 10 FT.
- B. MAX variation from Plumb of grid members caused by eccentric loads: 2 degrees.

### 3.05 CLEANING AND REPLACEMENT

- A. Suspension system: Remove infill material and perform any necessary cleaning maintenance with non-solvent based commercial cleaner.
- B. Touch up all minor scratches and spots, as acceptable, or replace damaged sections when touch up is not permitted.

- C. Painting: Repainting of suspension members shall be with a high-quality solvent base paint and applied as recommended by paint manufacturer.
- D. Removal of debris: Remove all debris resulting from work of this section.
- E. Clean exposed surfaces of ceiling systems. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- F. Remove and replace ceiling system components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and deformed members.

3.06 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION

**09 65 00**  
**RESILIENT FLOORING**

1.0 GENERAL

1.01 SUMMARY

- A. Provide resilient flooring, wall base and accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Samples of each item, color and pattern available in the specified grades from the proposed manufacturers.
  - 3. Safety Data Sheets (SDS) available for flooring products, adhesives, patching/leveling compounds, floor finishes (polishes) and cleaning agents.

1.03 REFERENCES

- A. Armstrong Flooring Guaranteed Installation Systems manual, F-5061.
- B. Armstrong Flooring Maintenance Recommendations and Procedures, manual, F-8663.
- C. ASTM E648: Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- D. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- E. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- F. ASTM F1066: Standard Specification for Vinyl Composition Tile.
- G. ASTM F1482: Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
- H. ASTM F1861: Standard Specification for Resilient Wall Base.
- I. ASTM F1869: Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- J. ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- K. NFPA 253: Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
- L. NFPA 258: Standard Test Method for Measuring the Smoke Generated by Solid Materials.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Single-source responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
- C. Select an installer who is competent in the installation of resilient products specified in this Section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

- D. Storage: Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 HRS before beginning installation.

#### 1.06 PROJECT CONDITIONS

- A. Maintain MIN temperature of 65°F and a MAX temperature of 100°F in spaces to receive resilient flooring materials for at least 48 HRS prior to installation, during installation, and for not less than 48 HRS after installation.
- B. Acclimate resilient flooring materials to temperature and humidity conditions in spaces where they will be installed for at least 48 HRS before beginning installation.
- C. Maintain MIN temperature of 55°F in areas where work is completed.
- D. Protect all materials from the direct flow of heat from hot-air registers, radiators or other heating fixtures and appliances.
- E. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
- F. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test.

#### 1.07 WARRANTY

- A. Resilient flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.
- B. Warranty period: 5 YRS.

#### 1.08 EXTRA STOCK

- A. At completion of the project, deliver to the Owner an extra stock of approximately 5% of each color and pattern in each material installed under this Section, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.

### 2.0 PRODUCTS

#### 2.01 RESILIENT MATERIALS

- A. Vinyl composition tile:
  - 1. Provide 'Standard Excelon Imperial Texture' 12 x 12 IN x 1/8 IN gage tile, conforming to ASTM F1066, Class 2 Through-Pattern, Type II, as manufactured by Armstrong, Tel. 888-276-7876, Web [www.armstrongflooring.com/commercial](http://www.armstrongflooring.com/commercial).
  - 2. Color selection: Classic White #51911.
- B. Rubber base:
  - 1. Provide 'BaseWorks Thermoset Rubber Wall Base' 4 IN high x 1/8 IN gage cove base, conforming to ASTM F1861, Type TS, Group 1, as manufactured by Johnsonite, Tel. 800-899-8916, Web [www.johnsonite.com](http://www.johnsonite.com).
  - 2. Color selection: Pebble #32.
- C. Substitutions will not be approved as selections are part of an Owner adopted Material Selections Building Standard.

#### 2.02 OTHER MATERIALS

- A. Provide non-staining type concrete slab primer as recommended by resilient flooring manufacturer.
- B. Provide latex type leveling and patching compound as recommended by resilient flooring manufacturer for patching, smoothing and leveling monolithic subfloors.
- C. Provide waterproof and stabilized type adhesives as recommended by the resilient flooring and wall base manufacturer. Asphalt emulsions will not be acceptable.
- D. Provide plastic filler as recommended by the resilient wall base manufacturer for sealing joints between the top of wall based and irregular wall surfaces such as masonry.

- E. Provide 1 IN wide resilient edge strips of equal gage as flooring, of homogeneous vinyl or rubber composition, with tapered or bullnose edge, with color to match or contrast with the flooring, as selected by the Architect from standard colors available, where required to provide a gradual transition in floor covering heights.
- F. Provide metal edge strips of required thickness to protect exposed edges of the resilient flooring where applicable. Provide units of MAX available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with standard finish selected by the Architect.
- G. Provide water emulsion floor wax.
- H. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).
- B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
- C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
- D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
- E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

#### 3.02 PREPARATION

- A. Subfloor preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with leveling and patching compounds recommended by resilient flooring manufacturer. Refer to resilient flooring manufacturer's installation systems manual and ASTM F710 for additional information on subfloor preparation.
- B. Subfloor cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the resilient flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material. Refer to the resilient flooring manufacturer's installation systems manual and ASTM F710 for additional information on subfloor preparation.

- C. Perform subfloor moisture testing in accordance with ASTM F2170 and/or ASTM F1869 and bond tests as described in the resilient flooring manufacturer's installation systems manual to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. 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. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.
- D. Concrete pH testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.
- E. If required by resilient flooring manufacturer, apply concrete slab primer in accordance with resilient flooring manufacturer's installation systems manual prior to application of adhesive.

### 3.03 INSTALLATION OF FLOORING

- A. Install flooring in strict accordance with the latest edition of resilient flooring manufacturer's installation systems manual. Failure to comply may result in voiding the manufacturer's warranty listed in Section 1.07.
- 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.

### 3.04 INSTALLATION OF ACCESSORIES

- A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.
- B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.
- C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.
- D. Apply butt-type or overlap metal edge strips as required by adjacent flooring materials. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

### 3.05 CLEANING AND WAXING

- A. Prior to cleaning and waxing, replace all damaged and nonseated tile. Roll to level with surrounding tile.
- B. Perform initial and on-going maintenance in strict accordance with the latest edition of resilient flooring manufacturer's installation systems manual.
- C. At completion of entire work and just prior to acceptance of building, clean and wax resilient flooring as follows:
  1. Sweep or vacuum floor thoroughly.
  2. Remove any excess adhesive and other surface blemishes, using appropriate cleaner recommended by the resilient flooring manufacturer.
  3. Rinse with clear lukewarm water and let dry.
  4. Apply a thin, even coat of water emulsion wax to entire floor and buff with buffing machine.

3.06 PROTECTION

- A. Protect resilient flooring against damage during construction period to comply with resilient flooring manufacturer's directions.
- B. Protect resilient flooring against damage from rolling loads for initial period following installation. Use dollies to move stationary equipment or furnishings across floors.
- C. Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

END OF SECTION

**09 68 00  
CARPETING**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide modular carpet tile floor covering and carpet accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
  - B. Related work:
    - 1. Section 09 30 13: Ceramic Tiling.
    - 2. Section 09 65 13: Resilient Flooring.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
    - 2. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- 1.03 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.04 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
  - B. Deliver materials with manufacturer's identification labels intact.
- 1.05 PROJECT CONDITIONS
  - A. Install carpet after all other finishing operations are complete.
- 1.06 EXTRA STOCK
  - A. Furnish MIN 1% additional modular carpet tile flooring of each type, pattern and color, separately bundled, wrapped and labeled, for maintenance purposes.
- 1.07 WARRANTY
  - A. Furnish written 20 YR non-prorated warranty against excessive wear, delamination, edge ravel, zippering, resiliency loss, and static.
- 2.0 PRODUCTS
- 2.01 MODULAR CARPET TILE
  - A. Aftermath II #03026 as manufactured by Tarkett Tandus Centiva, 24 IN X 24 IN, Color Tapestry #23512.
  - B. Substitutions will not be approved as selection is part of an Owner adopted Material Selections Building Standard.
- 2.02 OTHER MATERIALS
  - A. Carpet base: Same as carpet above, 4 IN high, with sewed bead at top edge.
  - B. Adhesive: As recommended by the carpet manufacturer.
  - C. Leveling compound: Latex base, non-crumbling, non-staining type approved by the carpet manufacturer.
  - D. Reducer strips: Provide rubber binding/reducing strips of thickness to match carpet in color selected by the Architect from the manufacturer's standard colors.
  - E. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.



### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify proper moisture content of substrate; do not install until moisture is within limits acceptable to manufacturer.

#### 3.02 PREPARATION

- A. Immediately prior to installation of the work of this Section, thoroughly clean substrata and remove oil, grease, paint, varnish, hardeners, and other items which would adversely affect the bond of adhesive.
- B. Make substrata level and free from irregularities. Assure one constant floor height after modular carpet tile flooring is installed, filling low spots and grinding high spots as required.
- C. Fill all cracks, joints, holes or uneven areas with specified leveling compound and remove excess.
- D. Before commencing work, test an area with adhesive and carpet to determine "open-time" and bond.

#### 3.03 INSTALLATION

- A. Install modular carpet tile flooring in strict accordance with carpet manufacturer's recommendations.
- B. Scribe modular carpet tile flooring accurately to vertical surfaces. Use a template for any cuts for monuments or pattern, etc.
- C. Apply adhesive as recommended by carpet manufacturer.
- D. Do not mix dye lots in same area.
- E. Keep joint lines straight.
- F. Where carpet terminates at non-carpeted floor surface, install reducer strip.

#### 3.04 CLEANING

- A. Remove any spillage of adhesive from carpet face or tile joints using remover provided by manufacturer.
- B. Clean carpet of all spots, remove all loose threads with sharp scissors.
- C. Completely and thoroughly vacuum carpet.

#### 3.05 PROTECTION

- A. Provide a heavy non-staining paper or plastic walkway as required over carpeting in direction of traffic, maintaining intact until carpeted space is accepted by the Owner.

END OF SECTION

**09 91 00  
PAINTING**

1.0 GENERAL

1.01 SUMMARY

- A. Paint and finish exposed surfaces using the combination of materials listed on Painting Schedule in Part 3 of this Section, as specified herein and as needed for a complete and proper installation including, but not necessarily limited to:
  - 1. Complete finishing and painting of all unfinished surfaces unless noted otherwise.
  - 2. Painting of exposed conduit and pipe/duct insulation.
- B. Related work:
  - 1. Section 09 29 00: Gypsum Board: Taping and bedding.
  - 2. Priming or priming and finishing of certain surfaces may be specified to be factory-performed or installer-performed under pertinent other Sections.
- C. Work not included: Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
  - 1. Prefinished or factory-finished items not to be painted include:
    - a. Acoustic materials.
    - b. Architectural woodwork and casework.
    - c. Light fixtures.
    - d. Switchgear.
    - e. Distribution cabinets.
  - 2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:
    - a. Foundation spaces.
    - b. Furred spaces.
    - c. Pipe chases.
    - d. Duct shafts.
  - 3. Finished metal surfaces not to be painted include:
    - a. Anodized aluminum.
    - b. Stainless steel.
    - c. Chromium plate.
    - d. Copper.
    - e. Bronze.
    - f. Brass.
  - 4. Operating parts not to be painted include moving parts of operating equipment including the following:
    - a. Valve and damper operators.
    - b. Linkages.
    - c. Sensing devices.
    - d. Motor and fan shafts.
  - 5. Do not paint over UL, FM, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Definitions:
  - 1. "Paint", as used herein, means coating systems materials, primers, emulsions, epoxy, enamels, stains, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Paint schedule indicating type and location of surface, paint materials and number of coats to be applied.
  - 3. Color charts of colors available from the approved manufacturer for selection by the Architect.

- C. Samples:
  - 1. Following the selection of colors and glosses by the Architect, prepare Samples of each color and texture at the job site for approval of the Architect.
  - 2. Revise each Sample as requested until the required gloss, color, and texture is achieved. Such Samples, when approved, will become standards of color and finish for accepting or rejecting the work of this Section.
  - 3. Do not commence finish painting until Samples are approved by the Architect.

#### 1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Paint coordination:
  - 1. Provide finish coats which are compatible with the prime coats actually used.
  - 2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrates.
  - 3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
  - 4. Provide barrier coats over noncompatible primers or remove the primer and reprime as required.
  - 5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime-coatings supplied under other Sections.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery: Deliver materials to job site in the manufacturer's sealed containers with the manufacturer's labels intact indicating manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation and instructions for mixing and reducing.
- C. Storage: Store materials not in use in tightly covered containers in a well-ventilated area at a MIN ambient temperature of 45°F and a MAX of 90°F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
- D. Protection: Protect materials from freezing. Keep storage area neat and orderly. Remove oily or solvent soaked rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

#### 1.05 PROJECT CONDITIONS

- A. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45°F and 95°F.
- B. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50°F and 90°F.
- C. Weather conditions:
  - 1. Do not apply paint in snow, rain, fog, or mist; when the relative humidity exceeds 85%; at temperatures less than 5°F above the dew point; or to damp or wet surfaces.
  - 2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

#### 1.06 EXTRA STOCK

- A. Provide 1 GAL additional material of each type, color and gloss of material installed for use by Owner in building maintenance and repair.
- B. Provide sealed containers of extra materials, packaged with protective covering for storage and identified with appropriate labels.

## 2.0 PRODUCTS

### 2.01 PAINT MATERIALS

- A. Acceptable materials:
  - 1. The Painting Schedule in Part 3 of this Section is based, in general, on products of Sherwin-Williams Paint Co.
  - 2. Equal products of other manufacturers approved in advance by the Architect, may be substituted in accordance with provisions of the Contract.
  - 3. Where products are proposed other than those specified by name and number in the Painting Schedule, provide under the product data submittal required by Part 1 of this Section a new painting schedule compiled in the same format used for the Painting Schedule included in this Section.
- B. Undercoats and thinners:
  - 1. Provide undercoat paint produced by the same manufacturer as the finish coat.
  - 2. Use only the thinners recommended by the paint manufacturer and use only to the recommended limits.
  - 3. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

### 2.02 COLOR SCHEDULES

- A. The Architect will prepare a color schedule with samples for guidance in painting.

### 2.03 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

### 2.04 OTHER MATERIALS

- A. Provide commercial quality linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

### 3.02 WALL TEXTURE

- A. At existing partitions to remain: Apply skim coat of drywall bedding compound over existing 'orange peel' texture and float to level.
  - 1. Where existing doors/frames are removed in existing walls and openings filled with metal studs & gypsum drywall, ensure smooth even finish from existing wall surfaces to new infill wall surfaces.
- B. Sand wall surfaces as required for smooth surface free of blemishes.
- C. Dust, sweep, dry rag or damp sponge walls leaving gypsum board surfaces sound, firm and dry, clean and free of sanding dust, dirt, grease or other foreign material.
- D. Prime gypsum board wall surfaces in accordance with texture manufacturer's recommendations.
- E. Texture on all new gypsum board surfaces shall be produced with paint roller, medium texture.

### 3.03 MATERIALS PREPARATION

- A. General:
  - 1. Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Architect.
  - 2. When materials are not in use, store in tightly covered containers.
  - 3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.
- B. Stirring:
  - 1. Stir materials before application, producing a mixture of uniform density.
  - 2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

### 3.04 SURFACE CLEANING METHODS

- A. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
- B. Hand Tool Cleaning, SSPC-SP2: Hand tool cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
- C. Power Tool Cleaning, SSPC-SP3: Power tool cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
- D. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A white metal blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
- E. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A commercial blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33% of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
- F. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A brush-off blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
- G. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
- H. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A near white blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5% of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.

- I. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
- J. Water Blasting, NACE Standard RP-01-72: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 PSI at a flow of 4 to 14 GAL per minute.
- K. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

### 3.05 SURFACE PREPARATION

- A. General:
  - 1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Architect.
  - 2. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface-applied protection prior to surface preparation and painting operations.
  - 3. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
  - 4. Clean each surface to be painted prior to applying paint or surface treatment.
  - 5. Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash point in excess of 200°F, prior to start of mechanical cleaning.
  - 6. Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
  - 7. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.
- B. Preparation of wood surfaces:
  - 1. Clean wood surfaces until free from dirt, oil, and other foreign substance.
  - 2. Seal knots, pitch streaks, and sappy sections with sealer.
  - 3. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.
  - 4. After priming or stain coat has been applied, all nail holes and other holes and cracks shall be flush-filled with putty in a neat and workmanlike manner. Putty shall be colored to match that of the finish.
  - 5. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less.
- C. Preparation of metal surfaces:
  - 1. Thoroughly clean surfaces until free from dirt, oil, and grease.
  - 2. Sand and scrape to remove loose primer, mill scale, weld splatter, dirt and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Feather edges to make touchup patches inconspicuous.
  - 3. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding.
  - 4. Allow to dry thoroughly before application of paint.
- D. Preparation of block and concrete surfaces:
  - 1. Remove loose mortar and foreign material.
  - 2. Remove efflorescence, chalk, dust, dirt, grease, oils, hardeners, curing compounds, and form release agents.
  - 3. Roughen as required to remove glaze.

4. Fill bug holes, air pockets, and other voids with cement patching compound.
  5. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
  6. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
  7. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.
  8. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface.
- E. Preparation of vinyl, plastic, and fiberglass surfaces:
1. Clean thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly.
  2. Do not paint vinyl siding with any color darker than the original color unless the product and colors are designed for such use. Painting with darker colors may cause siding to warp.
- F. Preparation of plaster surfaces:
1. Allow to dry thoroughly for at least 30 days before painting, unless the products are designed to be used in high pH environments.
  2. Room must be ventilated while drying; in cold, damp weather, rooms must be heated.
  3. Repair damaged areas with an appropriate patching material.
  4. Bare plaster must be cured and hard.
  5. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 PT household vinegar to 1 GAL of water. Repeat until the surface is hard, rinse with clear water and allow to dry.
- G. Preparation of cement composition siding/panels:
1. Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry.
  2. Existing peeled or checked paint should be scraped and sanded to a sound surface.
  3. Pressure clean, if needed, with 2,100 PSI MIN pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly.
  4. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.

### 3.06 PAINT APPLICATION

- A. General:
1. Touch-up shop-applied prime coats which have been damaged, and touch-up bare areas prior to start of finish coats application.
  2. Sand and dust between coats to remove defects visible to the unaided eye from a distance of 5 FT.
  3. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
  4. On removable panels and hinged panels, paint the back sides to match the exposed sides.
- B. Drying:
1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.
  2. Consider oil-base and oleo-resinous solvent-type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Brush application:
1. Brush out and work the brush coats onto the surface in an even film.
  2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

- D. Spray application:
  - 1. Except as specifically otherwise approved by the Architect, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
  - 2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
  - 3. Do not double back with spray equipment to build up film thickness of two coats in one pass.
- E. For completed work, match the approved Samples as to texture, color, and coverage. Remove, refinish, or repaint work not in compliance with the specified requirements.
- F. Miscellaneous surfaces and procedures:
  - 1. Exposed mechanical and electrical items:
    - a. Paint access doors, conduits, pipes, ducts, vents and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
    - b. Paint all equipment, including that which is factory-finished, exposed to view outdoors and on the roof, and in finished areas.
    - c. Paint shop-primed items occurring in finished areas.
    - d. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
    - e. Paint visible duct surfaces behind vents, registers, and grilles flat black.
    - f. Wash metal with solvent, prime, and apply two coats of alkyd enamel.
  - 2. Exposed pipe and duct insulation:
    - a. Apply 1 coat of latex paint on insulation which has been sized or primed under other Sections, apply 2 coats on such surfaces when unprepared.
    - b. Match color of adjacent surfaces.
    - c. Remove band before painting and replace after painting.
  - 3. Hardware:
    - a. Paint prime coated hardware to match adjacent surfaces.
    - b. Paint metal portions of head, jamb and astragal seals to match the color of the door frame unless otherwise directed by the Architect.
  - 4. Backboards:
    - a. Paint both sides and edges of plywood backboards for electrical and telephone equipment prior to installing equipment.
  - 5. Wet areas:
    - a. In janitor's closet, toilet rooms and contiguous areas, add an approved fungicide to paints.

### 3.07 LABELING FIRE AND SMOKE PARTITIONS

- A. Label fire and smoke partitions in plenum spaces and above ceiling in 2 IN high red letters spaced 20 FT OC MAX.
- B. Label fire rated partitions "FIRE PARTITION - DO NOT PENETRATE".
- C. Label smoke barrier partitions "SMOKE PARTITION - DO NOT PENETRATE".

### 3.08 PAINTING SCHEDULE

- A. Provide the following paint finishes.
- B. Exterior metal, ferrous:
  - 1. First Coat: S-W Industrial Pro-Cryl Universal Primer, B66-310 Series.
  - 2. Second Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series.
  - 3. Third Coat: Same as second coat.
- C. Interior metal, ferrous:
  - 1. First Coat: Touchup shop primer.
  - 2. Second Coat: S-W All Surface Enamel Latex Primer, 1.6 mils DFT.
  - 3. Third Coat: S-W ProMar 200 Latex Eg-Shel, 1.5 mils DFT.
  - 4. Fourth Coat: Same as third coat.
- D. Interior gypsum board walls:
  - 1. First Coat: S-W PrepRite High Build Latex Primer/Surfacer, 1.2 mils DFT.
  - 2. Second Coat: S-W ProMar 200 Latex Eg-Shel Enamel, 1.2 mils DFT.
  - 3. Third Coat: Same as second coat.



- E. Miscellaneous: Items not scheduled above shall be painted with like quality materials recommended by the manufacturer for the type of surface to be finished.

END OF SECTION

**10 14 00  
SIGNAGE**

1.0 GENERAL

1.01 SUMMARY

- A. Provide identifying devices where shown on the Drawings, as specified herein and as needed for a complete and proper installation including, but not necessarily limited to:
  - 1. Room signage.
  - 2. Toilet room signage.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings indicating fabrication method, dimensions, finish, layout, and details of installation and anchorage sufficient to enable proper interface of the work of this Section with the work of other Sections.
  - 3. One complete set of color chips representing the full range of available colors from the proposed manufacturer in the specified products.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Storage: Store products in manufacturer's packaging until ready for installation.

1.05 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results.

2.0 PRODUCTS

2.01 ROOM SIGNAGE

- A. Provide standard monolithic tactile room signs utilizing a thermoforming process which provides a fully homogeneous sign, with the following attributes.
  - 1. Material: 3/8 IN thick extruded engineered PVC/Acrylic alloy with integral background colors and high impact resistance; one piece construction.
  - 2. Size: 12 IN wide x 8 IN high.
  - 3. Tactile characters/symbols: Raised 1/32 IN from sign plate face.
  - 4. Lettering style: Typeface as selected from the manufacturer's standard san serif or simple serif typefaces, upper case letters, MIN height 5/8 IN, MAX height 2 IN.
  - 5. Braille: Grade 2 braille, placed directly below last line of letters or numbers.
  - 6. Contrast: Letters, numbers and symbols shall contrast with background.
  - 7. Bevel option: 45 degree.
  - 8. Profile: Standard rectangular.
  - 9. Surface texture: Slate.
  - 10. Mounting: Double-sided vinyl foam tape.
  - 11. Color selections to match room signage on 2<sup>nd</sup> floor:
    - a. Background: Pewter.
    - b. Border: Canyon.
    - c. Text & raised characters: White.

13. Text: Furnish 1 sign each reading:
  - a. 'JUVENILE PROBATION' at Door ETR to Lobby 101.
  - b. 'PROBATION OFFICES' at Door 01 (Lobby side).
  - c. 'LOBBY' at Door 01 (Corridor side).
  - f. 'WORK ROOM' at Door 03.
  - g. 'PROBATION 1' – 'PROBATION 26' (26) at Doors 04-29.
  - i. Personnel names (3) TBD during submittals for Doors 30-32.
  - l. 'STORAGE' at Door 35.
  - m. 'BREAKROOM' at Door 36.
  - j. 'CONFERENCE' (2) at Door 37 and Door ETR to Sm Conference 147.
  - q. 'DATA & RECORDS' at Door 38.
  - r. 'CONSTABLE STORAGE' at Door 39.
  - s. 'FACILITIES MAINTENANCE' at Door 40.
  - d. 'STAFF ONLY' (3) at Door 45, Door ETR from Elevator Lobby 155 to Corridor 102 (Elevator Lobby side), and Door ETR to Staff Corridor 149.
  - e. 'EXIT TO CORRIDOR' at Door ETR from Corridor 102 to Elevator Lobby 155 (JP Corridor side).
  - h. 'FIRE RISER' at Door ETR to Fire Riser 137.
  - k. 'HOUSEKEEPING' at Door ENL to Housekeeping 148.
  - n. 'ELECTRICAL' at Door ETR to Tel/Elec 154.
  - o. 'ELEVATOR EQUIPMENT' at Door ETR to Elev Equipment 157.
  - p. 'JANITOR' at Door ETR to Janitor 160.
- B. Acceptable products:
  1. 'ImPressions Series' as manufactured by Best Sign Systems, Montrose, CO, Tel. 800-235-2378, Web [www.bestsigns.com](http://www.bestsigns.com).
  2. Equal products of other manufacturers approved in advance by the Architect.

## 2.02 TOILET ROOM SIGNAGE

- A. Provide standard monolithic tactile room signs utilizing a thermoforming process which provides a fully homogeneous sign, with the following attributes.
  1. Material: 3/8 IN thick extruded engineered PVC/Acrylic alloy with integral background colors and high impact resistance; one piece construction.
  2. Size: 8 IN wide x 12 IN high.
  3. Tactile characters/symbols: Raised 1/32 IN from sign plate face.
  4. Lettering style: Typeface as selected from the manufacturer's standard san serif or simple serif typefaces, upper case letters, MIN height 5/8 IN, MAX height 2 IN.
  5. Braille: Grade 2 braille, placed directly below last line of letters or numbers.
  6. Contrast: Letters, numbers and symbols shall contrast with background.
  7. Bevel option: 45 degree.
  8. Profile: Standard rectangular.
  9. Surface texture: Slate.
  10. Mounting: Double-sided vinyl foam tape.
  11. Color selections to match toilet room signage on 2<sup>nd</sup> floor:
    - a. Background: Pewter.
    - b. Border: Canyon.
    - c. Text & raised characters: White.
  12. Text: Furnish one (1) sign each reading:
    - a. 'RESTROOM' and including the handicap symbol of accessibility and male/female figures, at Door 02.
    - b. 'WOMEN' and including the handicap symbol of accessibility and female figure (2), at Doors 34 and Door ETR to Women's Lav 161.
    - c. 'MEN' and including the handicap symbol of accessibility and male figure (2), at Doors 33 and Door ETR to Men's Lav 158.
- B. Acceptable products:
  1. 'ImPressions Series' as manufactured by Best Sign Systems, Montrose, CO, Tel. 800-235-2378, Web [www.bestsigns.com](http://www.bestsigns.com).
  2. Equal products of other manufacturers approved in advance by the Architect.

## 2.04 FABRICATION

- A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
- C. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
- D. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color and details of construction.
- E. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine signage for defects prior to installation; do not install damaged signage.

### 3.02 INSTALLATION

- A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- B. Install product level, plumb and at heights indicated.
- C. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.
- D. Install products within 1/4 IN vertically and horizontally of intended location.
- E. Install product in locations indicated using manufacturer's standard mounting hardware, vinyl foam tape, adhesive or holes and screws, and free from distortion, warp or defect adversely affecting appearance. Remove excess adhesives, etc. from exposed sign surfaces as recommended by adhesive manufacturer.
  - 1. Mount room signs and toilet room signs on wall 8 IN MAX measured from strike side of door frame to vertical centerline of tactile characters, and 48 IN MIN AFF measured from the baseline of the lowest tactile character and 60 IN MAX AFF measured from the baseline of the highest tactile character in location specified or as directed by Architect.

### 3.03 CLEANING AND PROTECTION

- A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 FT.
- B. Remove temporary coverings and protection to adjacent work areas. Remove construction debris from project.
- C. After installation clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until final acceptance of the Project.

END OF SECTION

**10 21 13**  
**PLASTIC TOILET COMPARTMENTS**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide solid plastic toilet compartments where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
    - 2. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, hardware and interface of the work of this Section with the work of adjacent trades.
    - 3. Color charts showing colors available from the proposed manufacturer in the specified products.
- 1.03 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.04 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
- 1.05 WARRANTY
  - A. Furnish manufacturer's 15 YR warranty against material breakage or corrosion.
- 2.0 PRODUCTS
- 2.01 PLASTIC TOILET COMPARTMENTS
  - A. Provide solid plastic toilet compartments in the dimensions and arrangements shown on the Drawings, and with the following attributes:
    - 1. Doors, panels and pilasters: 1 IN thick solid plastic, waterproof, non-absorbent, high density polyethylene (HDPE) with all edges machined to 0.250 IN radius.
    - 2. Design: Floor mounted, overhead braced.
    - 3. Hinges: Integral hinge system.
    - 4. Brackets: Continuous plastic.
    - 5. Pilaster shoes: Solid plastic.
    - 6. Color selection: Hadrian Mocha #225 to match plastic toilet compartments on 2<sup>nd</sup> floor.
    - 7. Hardware: Manufacturer's standard heavy duty, tamper resistant anchors, brackets, hardware and fasteners.
    - 8. Accessories: Manufacturer's standard bumper/coat hook for each toilet compartment door.
  - B. Acceptable products:
    - 1. "Headrail Braced Standard Solid Plastic Toilet Partition" series as manufactured by Hadrian, Inc., distributed by Chatham Worth, Flower Mound, Texas, Tel. 972-241-2331, Web [www.chathamworth.com](http://www.chathamworth.com), or equal products of other manufacturers approved in advance by the Architect, as scheduled on the Drawings.
- 2.02 OTHER MATERIALS
  - A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position, plumb, level, and square for long life under hard use.
- C. No evidence of drilling, cutting, or patching shall be visible in the finish work.
- D. Install operating hardware and accessories in accordance with ADA/TAS standards.
  - 1. Install bumper/coat hook in HC accessible toilet stalls 48 IN AFF MAX.
- E. Adjust toilet compartment doors to remain in a uniformly closed position when unlocked.

END OF SECTION

**10 26 13**  
**CORNER GUARDS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide corner guards where shown on the Drawings, as specified herein and as needed for a complete and proper installation, matching existing corner guards on second floor with respect to manufacturer, model number, dimensions, texture, color, etc.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  2. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
  3. Samples of standard colors available from the proposed manufacturer in the specified products.
  4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
  5. Certification from manufacturer indicating compliance with ADA/TAS requirements.

1.03 REFERENCES

- A. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver materials to site in manufacturer's original, unopened containers and packaging with labels clearly indicating manufacturer and material.
- C. Store materials indoors in clean, dry area protected from damage and in accordance with manufacturer's instructions.
- D. Protect materials during handling and installation to prevent damage.

1.06 PROJECT CONDITIONS

- A. Maintain constant MIN air temperature of 65°F for a MIN of 48 HRS before and during installation.
- B. Maintain wall surface temperature between 65°F and 85°F during installation.
- C. Maintain relative humidity less than 80% in areas receiving corner guards.

2.0 PRODUCTS

2.01 CORNER GUARDS

- A. Where indicated on the Drawings, provide the following products of Korogard Wall Protection Systems, distributed by Kenmark, Inc., Tel. 214-348-8000, Web [www.korogard.com](http://www.korogard.com) or CS Acrovyn, Tel. 800-233-8493, Web [www.c-sgroup.com/acrovyn-wall-protection](http://www.c-sgroup.com/acrovyn-wall-protection) or equal products of other manufacturers approved in advance by the Architect. Verify manufacturer/model number of existing corner guards on second floor; intent is to match existing corner guards to MAX extent possible.

1. Korogard G100 Series or Acrovyn SSM-20N Series Corner Guards with the following attributes.
  - a. Dimensions: 2 x 2 IN leg length x 90 degree angle with 1/4 IN radius.
  - b. Material: High-impact vinyl acrylic extrusion locked in place, nominal 0.078 IN thick, Class I fire rating when tested in accordance with ASTM E84.
  - c. Extrusion: Pebble grain finish, containing EPA-registered antimicrobial agent.
  - d. Retainer: Continuous 6063-T6 aluminum retainer along entire length of corner guard, MIN 0.060 IN thick.
  - e. End caps: Injection-molded unit of color and texture similar to that of corner guard.
  - d. Length: Guards shall extend from top of wall base to 6 FT above finish floor.
  - f. Color selection: Eggshell #100 to match corner guards on 2<sup>nd</sup> floor.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3.0 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. Install corner guards accurately in location, alignment and elevation.
- D. Install corner guards on ALL exterior corners of gypsum board surfaced walls with bottom of corner guard located immediately above wall base.

END OF SECTION



**10 26 16**  
**BUMPER GUARDS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide bumper guards where shown on the Drawings, as specified herein and as needed for a complete and proper installation, matching existing bumper guards on second floor with respect to manufacturer, model number, dimensions, texture, color, etc.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Shop Drawings in sufficient detail to show components, fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
  - 3. Samples of standard colors available from the proposed manufacturer in the specified products.
  - 4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
  - 5. Certification from manufacturer indicating compliance with ADA/TAS requirements.

1.03 REFERENCES

- A. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with NFPA 101 for interior finish materials. Smoke developed less than 450 and flame spread of 25 or less in accordance with ASTM E84.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging with labels clearly indicating manufacturer and material.
- C. Storage: Store materials indoors in clean, dry area protected from damage and in accordance with manufacturer's instructions.
- D. Handling: Protect materials during handling and installation to prevent damage.

1.06 PROJECT CONDITIONS

- A. Maintain constant MIN air temperature of 65°F for a MIN of 48 HRS before and during installation.
- B. Maintain wall surface temperature between 65°F and 85°F during installation.
- C. Maintain relative humidity less than 80% in areas receiving corner guards.

1.07 WARRANTY

- A. Provide bumper guard manufacturer's standard 5 YR warranty.

## 2.0 PRODUCTS

### 2.01 BUMPER GUARDS

A. Where indicated on the Drawings, provide the following products of Korogard Wall Protection Systems, distributed by Kenmark, Inc., Tel. 214-348-8000, Web [www.korogard.com](http://www.korogard.com) or equal products of other manufacturers approved in advance by the Architect. Verify manufacturer/model number of existing bumper guards on second floor; intent is to match existing bumper guards to MAX extent possible.

1. "Korogard" C800 Series Bumper Guards with the following attributes.
  - a. Dimensions: 8 IN high x 1-1/4 IN wide.
  - b. Material: High-impact vinyl acrylic extrusion locked in place, nominal 0.100 IN thick, Class A fire rating when tested in accordance with ASTM E84.
  - c. Extrusion: Pebble grain finish, containing EPA-registered antimicrobial agent.
  - d. Retainer: Continuous 6063-T5 aluminum retainer along entire length of corner guard, minimum 0.080 IN thick.
  - e. End caps: Injection-molded preassembled wall return unit of color and texture similar to that of bumper guard.
  - f. Corners: Internal and external corner units of similar material to end cap units. Carry line of bumper guard continuously around corners unless otherwise shown on the Drawings.
  - g. Color selection: Eggshell #100 to match bumper guards on 2<sup>nd</sup> floor.

### 2.02 OTHER MATERIALS

- A. Provide bumper guard manufacturer's standard extended end caps, splice kits, etc. to match bumper guard as required for a complete wall protection system.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. Provide horizontal steel stud back-up in drywall stud cavity to accept fasteners.
- D. Install bumper guards accurately in location, alignment and elevation, 36 IN AFF to centerline of bumper guard.

END OF SECTION

**10 28 13**  
**TOILET ACCESSORIES**

1.0 GENERAL

1.01 SUMMARY

- A. Provide toilet accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 09 29 00: Gypsum Board: Backer plates.
  - 2. Section 10 21 13: Plastic Toilet Compartments.
  - 3. Section 10 28 14: Baby Changing Stations.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Shop Drawings or Product Data in sufficient detail to show fabrication, type, size, finish, anchorage, and interface with the work of other trades.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

2.0 PRODUCTS

2.01 TOILET ACCESSORIES

- A. Provide products of Kimberly Clark and the Bradley Corporation, Washroom Accessories Division, distributed by Charles F. Williams Co., Inc., Ft. Worth, Texas, Tel. 817-332-6363, Web [www.chasfwilliams.com](http://www.chasfwilliams.com), or equal products of other manufacturers approved in advance by the Architect, as scheduled on the Drawings.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3.0 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on the Drawings.

3.02 MOUNTING HEIGHTS

- A. Mount toilet accessories at the heights scheduled on the Drawings or as required by Texas Accessibility Standards (TAS) and the Americans with Disabilities Act (ADA). If conflicts exist, TAS and ADA shall govern over schedule on Drawings.

3.03 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
  - 1. Construct openings in wall of size required for recessed units.
  - 2. Install wood blocking or metal backer plates fastened to studs for mounting accessories. Mounting to wall board only will not be permitted.

- B. Install units plumb, level, and firmly anchored in locations and at heights indicated, in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of units.
- C. The structural strength of grab bars, tub and shower seats, fasteners and mounting devices shall meet the following specification:
  - 1. Bending stress in a grab bar or seat induced by the MAX bending moment from the application of 250 LBF shall be less than the allowable stress for the material of the grab bar or seat.
  - 2. Shear stress induced in a grab bar or seat by the application of 250 LBF shall be less than the allowable shear stress for the material of the grab bar or seat. If the connection between the grab bar or seat and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress.
  - 3. Shear force induced in a fastener or mounting device from the application of 250 LBF shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.
  - 4. Tensile force induced in a fastener by a direct tension force of 250 LBF plus the maximum moment from the application of 250 LBF shall be less than the allowable withdrawal load between the fastener and the supporting structure.
  - 5. Grab bars shall not rotate within their fittings.

END OF SECTION

**10 28 14**  
**BABY CHANGING STATIONS**

1.0 GENERAL

1.01 SUMMARY

- A. Provide baby changing stations where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- B. Related work:
  - 1. Section 06 10 00: Rough Carpentry: Blocking and Backer plates.
  - 2. Section 09 30 13: Ceramic Tiling: Coordination with tile layout and installation.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Submit:
  - 1. Shop Drawings or Product Data in sufficient detail to show fabrication, type, size, templates and rough-in measurements, finish, anchorage, and interface with the work of other trades.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Manufacturer: Provide products manufactured by a company with 5 YRS MIN successful experience manufacturing similar products.
- C. Single source requirements: To the greatest extent possible provide products from a single manufacturer.
- D. Accessibility requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA, TAS and ANSI A117.1 requirements as applicable.
- E. Baby changing stations: Provide products which comply with the following standards and requirements.
  - 1. Antimicrobial treatment: Changing surfaces embedded with Microban®, with antibacterial claim substantiated by Kirby-Bauer test or other manufacturer approved equivalent standard industry test methodology.
  - 2. Americans with Disabilities Act (ADA).
  - 3. Texas Accessibility Standards (TAS).
  - 4. ANSI A117.1: Accessible and Usable Building and Facilities.
  - 5. ANSI Z535.4: Product Safety Signs and Labels.
  - 6. ASTM F2285: Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.
  - 7. ASTM G21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
  - 8. CPSIA: Conformity with the U.S. Product Safety Commission product safety rules, bans, standards and regulations that include applicable chemical compliance requirements.
- F. Manufacturing location: United States.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.05 WARRANTY

- A. Submit manufacturer's standard 5 YR warranty for materials and workmanship and include a provision for replacement caused by vandalism.

## 2.0 PRODUCTS

### 2.01 APPROVED MANUFACTURERS

- A. Provide products of Koala Kare Products, distributed by Chatham Worth, Flower Mound, Texas, Tel. 972-241-2331, Web [www.chathamworth.com](http://www.chathamworth.com), or equal products of other manufacturers approved in advance by the Architect, as scheduled on the Drawings.

### 2.02 BABY CHANGING STATIONS

- A. Koala Model KB200-11 surface-mounted horizontal design baby changing station, Earth color with the following characteristics:
  1. Materials: FDA approved injection-molded polypropylene.
  2. Operation: Concealed pneumatic cylinder providing controlled, slow opening and closing of the changing station bed.
  3. Hinge mechanism: Reinforced full length steel-on-steel hinge.
  4. Changing surface: Contoured, concave and smooth, 450 SI.
  5. Safety straps: Replaceable, snap-lock, nylon protective holding straps.
  6. Performance: When mounted to specification, unit has been tested to 300 LBS and will deflect less than 1 degree from 90 degrees with a 200 LB static load placed in the center of the changing surface.
  7. Mounting: Concealed 11 gage plated steel mounting chassis with 16 IN centers and 6 mounting points with the top 2 mounting points featuring keyholes for ease of installation. Units include mounting hardware.
  8. Features: No hinge structure exposed on interior or exterior surfaces; two bag hooks; locking built-in dual cavity liner dispenser with 50 liner capacity supplied with 2 keys that are keyed alike to Bobrick Washroom Accessories.
  9. Instruction graphics: Universal instruction graphics and safety messages in multiple languages.
  10. Labels: Optional Braille labels included.

### 2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on the Drawings.

### 3.02 MOUNTING HEIGHTS

- A. Mount baby changing stations at the heights scheduled on the Drawings or as required by Texas Accessibility Standards (TAS) and the Americans with Disabilities Act (ADA). If conflicts exist, TAS and ADA shall govern over schedule on Drawings.

### 3.03 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
  1. Verify blocking or metal backer plates have been installed properly. Mounting to wall board only will not be permitted.
  2. Verify location does not interfere with door swings or use of fixtures.
  3. Use fasteners and anchors suitable for substrate and project conditions.
  4. Install units level, plumb and in proper relationship with adjacent construction.
  5. Adjust for proper operation.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damage products prior to Substantial Completion.

END OF SECTION

**10 44 00**  
**FIRE PROTECTION SPECIALTIES**

1.0 GENERAL

1.01 SUMMARY

- A. Provide fire extinguishers, cabinets, and accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00.  
B. Submit:
1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements and including mounting details, door hardware, cabinet type and materials, trim style, and door construction.
  2. Manufacturer's installation instructions indicating special criteria and wall opening coordination requirements.
  3. Manufacturer's data including test, refill or recharge schedules and re-certification requirements.

1.03 REFERENCES

- A. NFPA 10: Standard for Portable Fire Extinguishers.  
B. UL FPED: Fire Protection Equipment Directory.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.  
B. Except as otherwise approved by the Architect, provide all products of this Section from a single manufacturer.  
C. Portable fire extinguishers shall conform to NFPA 10.  
D. Portable fire extinguishers shall conform to UL FPED and shall bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

2.0 PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Design is based on use of standard products manufactured by J.L. Industries, distributed by Chatham Worth, Flower Mound, Texas, Tel. 972-241-2331, Web [www.chathamworth.com](http://www.chathamworth.com), and trade names of that manufacturer are used herein.  
B. Provide the products upon which design is based or provide equal products of another manufacturer approved in advance by the Architect.

2.02 FIRE EXTINGUISHER CABINETS

- A. Where shown on the Drawings (noted as FEC) on stud walls, provide fire extinguisher cabinets with the following attributes:
1. Model: Ambassador 1012F12, semi-recessed, steel door and trim.
  2. Finish: Electrostatic white epoxy.
  3. Door glazing: 1/4 IN clear acrylic.
  4. Bracket: As required by extinguisher and cabinet.
  5. Options: ADAC Option (A.D.A. approved): 4 IN return trim and flush pull.
  6. Mounting height: Bottom 36 IN AFF or complying with applicable regulations of governing authorities.
  7. Location:
    - a. #106 CORRIDOR 2.
    - b. #133 CORRIDOR 6.



### 2.03 FIRE EXTINGUISHERS

- A. At each fire extinguisher cabinet, provide one fire extinguisher with the following attributes:
  - 1. Type: Multi-purpose dry chemical.
  - 2. Model: Cosmic 6E, 6 lb. nominal capacity.
  - 3. U/L Rating: 3A-40BC.
- B. Service, charge and tag each fire extinguisher not more than five (5) calendar days prior to completion of the project.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. 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.
- D. Securely fasten fire extinguisher cabinets and mounting brackets to structure, square and plumb and to comply with manufacturer's instruction.
- E. Place extinguishers in cabinets.

END OF SECTION

**10 56 23**  
**WIRE STORAGE SHELVING**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide wire storage shelving systems and accessories where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- 1.03 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.04 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
- 2.0 PRODUCTS
- 2.01 APPROVED MANUFACTURERS
  - A. Design is based on use of standard products distributed by Heritage Storage Systems, Grand Prairie, Texas, Tel. 972-647-0747, and trade names of that distributor are used herein.
  - B. Provide the products upon which design is based or provide equal products of another manufacturer approved in advance by the Architect.
  - C. Except as otherwise approved by the Architect, provide all products of this Section from a single manufacturer.
- 2.02 WIRE SHELVING SYSTEM
  - A. Provide wire shelving system equal to "Super Erecta Shelf" with the following attributes:
    - 1. 18 IN deep x 42 IN long x 6 FT tall shelving units with 5 shelves, Model 5N347BR.
      - a. Ten (10) units in #148 HOUSEKEEPING.
    - 2. Posts: 1 IN diameter x 74 IN long with rolled, circular grooves at 1 IN OC, Model Standard Stationary Post.
    - 3. Connectors: Two piece aluminum, tapered "Split Sleeves", Model 9986Z.
    - 4. Finish: Polished zinc ("Super Erecta Brite").
- 2.03 OTHER MATERIALS
  - A. Label holders: Provide molded plastic label holders, one for each shelf in each shelf unit. Label holder shall be capable of holding labels 3 IN long by 1 IN high and shall snap attach to front shelf edge.
  - B. Shelf connectors: Provide security type shelf connectors including "S" hook, screw and bolt for securing "add-on" shelf to post-supported shelf, and with finish to match shelving.
  - C. Hole plugs: Provide hole plugs to fill "add-on" shelf-corner openings with finish to match shelving.
  - D. Foot plates: Provide metal foot plates at each post for leveling shelving system, Model 9993Z.
  - E. Mounting brackets: Provide mounting brackets as required for securing shelving units to wall, Model 9984C. Provide brackets at upper and middle shelf of each unit adjacent to wall.
  - F. Post clamps: Provide post clamps for joining adjacent shelving units together, Model 9994Z.

- G. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### 3.0 EXECUTION

#### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.

END OF SECTION

**12 21 13**  
**HORIZONTAL LOUVER BLINDS**

- 1.0 GENERAL
- 1.01 SUMMARY
  - A. Provide horizontal louver blinds as specified herein and as needed for a complete and proper installation.
- 1.02 SUBMITTALS
  - A. Comply with pertinent provisions of Section 01 33 00.
  - B. Submit:
    - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
    - 2. Color samples showing colors available from the proposed manufacturer in the specified products.
    - 3. Shop Drawings indicating field-measured dimensions of each opening to receive blinds, details on mounting surface and sill conditions, and details of corner and conditions between adjacent blinds.
- 1.03 QUALITY ASSURANCE
  - A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
  - B. Manufacturer qualifications: Company specializing in manufacturing the products specified in this Section with MIN 3 YRS experience.
  - C. Installer qualifications: Installer shall be a firm approved by the blinds manufacturer and qualified to install the product specified, as demonstrated by MIN 3 YRS experience.
- 1.04 DELIVERY, STORAGE AND HANDLING
  - A. Comply with pertinent provisions of Section 01 60 00.
  - B. Packaging and shipping:
    - 1. Materials shall be delivered to the project in blind manufacturer's original unopened packaging with labels intact.
    - 2. Stacks shall be covered with tarpaulins or plastic so that ventilation is provided for, and so that contaminants are prevented from contacting surfaces.
  - C. Storage:
    - 1. Materials shall be stored in a clean area which is free of corrosive fumes, dust, and away from construction activities.
    - 2. Materials shall be horizontally stacked using plastic or wood shims so that drainage and ventilation are provided for, and so that water cannot accumulate in, about or upon the containers.
- 1.05 PROJECT AND SITE CONDITIONS
  - A. Roof must be tight, windows and frames installed and glazed, and interior doors hung.
  - B. Wet work including concrete, masonry, plaster, stucco, terrazzo, sheetrock, spackling, and taping (including sanding) shall be complete and dry.
  - C. Ceilings, window pockets, electrical and mechanical work above the product shall be complete.
  - D. Electrical power (110 volt AC) shall be available for installer's tools within 500 FT of product installation areas.
- 1.06 WARRANTY
  - A. Provide blind manufacturer's limited lifetime warranty: Manufacturer shall repair or replace for the life of the blind, at its option, without charge, any part found defective in workmanship or material as long as the blind remains in the same window for which it was purchased.

## 2.0 PRODUCTS

### 2.01 HORIZONTAL LOUVER BLINDS

- A. Provide complete horizontal louver blinds system manufactured by Levolor, 1400 Lavon Drive, McKinney, Texas, or equal products of other manufacturers approved in advance by the Architect, with the following attributes.
1. Product: Levolor MARK I, 1 IN Blind.
- B. Materials:
1. Headrail shall be 0.025 IN thick painted steel, 1-1/2 IN high x 1-5/8 IN wide with a crowned underside profile to prevent light leakage. Headrail shall be a valance-free design and shall be coated with a baked-on finish. All headrail detailing shall be polyethylene. All hardware shall be enclosed in the headrail.
  2. Guardian tilter mechanism shall be 0.042 IN thick Tomized steel housing with a self-lubricating nylon, automatic disengaging worm gear mechanism to provide MAX closure, eliminate overdrive, and prevent strain or damage to blind.
  3. Tilt wand shall be solid, clear, transparent polymer with a round cross section 5/16 IN DIA. The tilt wand mechanism shall exit the bottom of the headrail via a U-shaped bright metal-plated steel link. The tilt wand end contains a split eye machining detail which facilitates attachment and removal of the wand to the headrail.
  4. Cord lock shall be 0.042 IN thick Tomized steel and shall be securely attached to headrail. It shall be a crash-proof type with sufficient sensitivity to lock slats at desired height upon release of cords.
  5. Drum and cradle shall be provided for each ladder.
    - a. Drums shall be 0.031 IN Tomized steel having 2 holes with rolled edges to anchor barbs of both ladders ends.
    - b. Cradles shall be of 0.042 IN thick Tomized steel having 3 holes with rolled edges to guide cords through bottom of headrail without abrasion. They shall provide bearing support for the tilt rod, thus preventing the weight of the blind from being transferred to the tilter. Cradles shall center drums over ladder openings.
  6. Tilt rod shall be designed to achieve a torsional deflection limit of less than or equal to 6 degrees per 30 IN length with an applied torque of 1 FT-LB. Tilt rod shall be solid D-shaped with an average cross section of 0.28 IN.
  7. Installation brackets shall be a one-piece, 0.032 IN zinc-plated spring steel designed to minimize light gaps. A spring mechanism provides preload engagement with the headrail. There are 2 types of installation brackets: a bracket designed for ceiling mount applications that is completely concealed within the headrail and a wall mount bracket. Six shims are supplied with each blind to assist in installation involving uneven surfaces.
  8. Intermediate brackets shall be of the same design as installation brackets. They shall be installed with blinds over 50 IN. Brackets shall be supplied as required.
  9. Ladders (slat supports) shall be braided polyester yarn dyed to Levolor color standards. The two vertical components shall be 0.076 IN x 0.038 IN designed for MAX flexibility combined with MIN stretch and tensile strength of not less than 50 LBS per cable. Horizontal components (rungs) shall consist of not less than 2 crossed cables inter-braided with the vertical components. Ladder shall support the slats without visible distortion. Distance between slats shall not exceed 21.3 MM. Distance between ladders shall not exceed 23 IN for blinds up to 80 IN long. For blinds over 80 IN long, distance between ladders shall not be greater than 22 IN. Distance between end ladder and end of slat shall not exceed 7 IN.
  10. Slat shall be 5000 series magnesium aluminum alloy to optimize tensile and yield strength for superior slat strength, resiliency, and corrosion resistance. Slats shall be nominally 1 IN wide and 8 gage thickness. Slats shall perform to 500 HRS of 100% relative humidity testing, 300 HRS of 5% salt spray solution at 95°F testing, and 250 HRS of accelerated weathering testing without blistering, fading, corroding, or adhesive failure. Slat thickness and ladder support distances shall prevent visible sag or bow after continued use indoors.

- a. Slats shall be SheerView perforated slats, perforated with a staggered pattern of 0.020 IN DIA holes, nominally 177 per IN of slat length. Slats shall have an openness factor of 6%.
  - b. Slats shall feature a paint process that disrupts the natural static attraction of airborne dust particles.
- 11. Bottomrail shall be of 0.029 IN thick painted steel and shall be fully enclosed with color compatible flexible vinyl bottom bumper and high-density polyethylene end caps designed to prevent bottomrail from marring window sill and/or mullions. End caps shall provide hold-down capability designed to prevent bottom bar sway on doors or in windy exposures.
  - 12. Lift cord shall be braided of high strength, 1.44 MM DIA polyester fiber, 34 picks per IN, 16 carrier smooth braids, and shall be flexible, have MIN stretch, MAX abrasion resistance characteristics, and a MIN breaking strength of 130 LBS. Cord shall be of sufficient length equalized to properly control raising and lowering of blind and spaced not over 46 IN between cords.
  - 13. Lift cord tassel shall allow for field adjustment of lift cord length.
  - 14. Color: As selected by the Architect from MARK I 1 IN Blind colors, including Tiltone colors, metallic finishes and specialty finishes. Select colors available with perforated slats.

## 2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 2.03 FABRICATION

- A. Prior to fabrication, verify actual opening dimensions by on-site measurement. Calculate dimension to fit within specified tolerances.
- B. Fabricate blinds to fill gypsum wallboard openings from head to sill and jamb to jamb. Locate blind divisions at centerline of vertical mullions where required by length.

## 3.0 EXECUTION

### 3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Window treatment contractor shall be responsible for inspection of site, field measurements and approval of mounting surfaces and installation conditions.
- C. Subcontractor shall verify that site is free of conditions that interfere with blind installation and operation, and shall begin installation only when any unsatisfactory conditions have been rectified.

### 3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Installation shall comply with blind manufacturer's specifications, standards, and procedures.
- C. Refer to installation instructions packaged with blinds for additional installation details.
- D. Provide adequate clearance to permit unencumbered operation of blind and hardware. Hold blinds 1/8 IN clear from each side of window opening on inside mount unless other clearance is indicated.
- E. Demonstrate blinds to be in uniform and smooth working order.
- F. Store installed blinds in fully stacked position to avoid damage and accumulation of dust and dirt until such time that these conditions are eliminated.

3.03 CLEANING

- A. Clean blinds with a mild liquid detergent soap solution and water just prior to occupancy. Do not use abrasive cleaners.
- B. Ensure proper drying following cleaning by providing adequate ventilation.

3.04 HORIZONTAL BLIND SCHEDULE

- A. Provide blinds at the following locations:
  - 1. All existing north windows in the following rooms:
    - a. #100 ENTRY LOBBY.
    - b. #101 LOBBY
    - c. #103 RECEPTION.
    - d. #106 CORRIDOR 2.
    - e. #139 WAITING NOOK.
    - f. #140 MANAGER 1.
    - g. #147 SM CONFERENCE.
    - h. #152 LG CONFERENCE.
  - 2. All existing east windows in the following rooms:
    - a. #140 MANAGER 1.
    - b. #141 MANAGER 2.
    - c. #142 MANAGER 3.
  - 3. All existing west windows in the following rooms:
    - a. #151 BREAKROOM.
    - b. #152 LG CONFERENCE.
  - 4. Two (2) new south windows Type D in #105 WORK/FILE ROOM.

END OF SECTION

## SECTION 21 11 00

### FIRE SUPPRESSION SPRINKLERS

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Particular attention to design-build scope of work on the drawings.
- B. Summary: This section includes fire-suppression sprinklers, piping, and equipment for the following building systems:
1. Wet-pipe, fire-suppression sprinklers, including piping, valves, specialties, and automatic sprinklers.
- C. Definitions:
1. CPVC: Chlorinated polyvinyl chloride plastic.
  2. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.
- D. System Performance Requirements:
1. Design sprinklers and obtain approval from authorities having jurisdiction.
    - a. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
      - 1) Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mL/s over 139-sq. m) area.
      - 2) Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (9.5 mL/s over 139-sq. m) area.
      - 3) Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. (12.6 mL/s over 139-sq. m) area.
      - 4) Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. (18.9 mL/s over 232-sq. m) area.
      - 5) Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. (25.2 mL/s over 232-sq. m) area.
      - 6) Special Occupancy Hazard: As determined by authorities having jurisdiction.
    - b. Maximum Protection Area per Sprinkler: As follows:
      - 1) Office Space: 225 sq. ft. (20.9 sq. m).
      - 2) Storage Areas: 130 sq. ft. (12.1 sq. m).
      - 3) Mechanical Equipment Rooms: 130 sq. ft. (12.1 sq. m).
      - 4) Electrical Equipment Rooms: 130 sq. ft. (12.1 sq. m).
      - 5) Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.
  2. Components and Installation: Capable of producing piping systems with 175-psi (1200-kPa) minimum working-pressure rating, unless otherwise indicated.
- E. Submittals:
1. Product Data: For the following:
    - a. Pipe and fitting materials and methods of joining for sprinkler piping.
    - b. Pipe hangers and supports.



- c. Valves, including specialty valves, accessories, and devices.
  - d. Alarm devices. Include electrical data.
  - e. Fire department connections. Include type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
  - f. Excess-pressure pumps. Include electrical data.
  - g. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
2. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, if applicable.
  3. Hydraulic calculations. All as required by local authorities.
  4. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
  5. Maintenance Data: For each type of sprinkler specialty to include in maintenance manuals specified in Division 1.

F. Quality Assurance:

1. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
2. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified engineer. Base calculations on results of fire-hydrant flow test.
3. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
4. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
6. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
  - a. NFPA 13, "Installation of Sprinkler Systems."
  - b. NFPA 231, "General Storage."
  - c. NFPA 231C, "Rack Storage of Materials."

## 1.2. PRODUCTS

A. Manufacturers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Specialty Valves and Devices:
    - 1) Badger Fire Protection, Inc.
    - 2) Central Sprinkler Corp.
    - 3) Firematic Sprinkler Devices, Inc.
    - 4) Globe Fire Sprinkler Corp.

- 5) Grinnell Corp.
  - 6) Reliable Automatic Sprinkler Co., Inc.
  - 7) Star Sprinkler Corp.
  - 8) Viking Corp.
- b. Water-Flow Indicators and Supervisory Switches:
- 1) Gamewell Co.
  - 2) Grinnell Corp.
  - 3) Pittway Corp.; System Sensor Div.
  - 4) Potter Electric Signal Co.
  - 5) Reliable Automatic Sprinkler Co., Inc.
  - 6) Viking Corp.
  - 7) Watts Industries, Inc.; Water Products Div.
- c. Sprinkler, Drain and Alarm Test Fittings:
- 1) Central Sprinkler Corp.
  - 2) Fire-End and Croker Corp.
  - 3) Grinnell Corp.
  - 4) Victaulic Co. of America.
- d. Sprinkler, Branch-Line Test Fittings:
- 1) Elkhart Brass Mfg. Co., Inc.
  - 2) Fire-End and Croker Corp.
  - 3) Smith Industries, Inc.; Potter-Roemer Div.
- e. Sprinkler, Inspector's Test Fittings:
- 1) Fire-End and Croker Corp.
  - 2) G/J Innovations, Inc.
  - 3) Triple R Specialty of Ajax, Inc.
- f. Fire Department Connections:
- 1) Badger Fire Protection, Inc.
  - 2) Elkhart Brass Mfg. Co., Inc.
  - 3) Fire-End and Croker Corp.
  - 4) Firematic Sprinkler Devices, Inc.
  - 5) Grinnell Corp.
  - 6) Guardian Fire Equipment, Inc.
  - 7) Reliable Automatic Sprinkler Co., Inc.
  - 8) Smith Industries, Inc.; Potter-Roemer Div.
- g. Sprinklers:
- 1) Badger Fire Protection, Inc.
  - 2) Central Sprinkler Corp.
  - 3) Firematic Sprinkler Devices, Inc.
  - 4) Globe Fire Sprinkler Corp.
  - 5) Grinnell Corp.
  - 6) Reliable Automatic Sprinkler Co., Inc.
  - 7) Star Sprinkler Corp.
  - 8) Viking Corp.
- h. Indicator Posts and Indicator-Post, Gate Valves:
- 1) American Cast Iron Pipe Co.; Waterous Co.

- 2) Grinnell Corp.
  - 3) McWane, Inc.; Clow Valve Co. Div.
  - 4) McWane, Inc.; Kennedy Valve Div.
  - 5) Nibco, Inc.
  - 6) Stockham Valves & Fittings, Inc.
- i. Indicator Valves:
    - 1) Central Sprink, Inc.
    - 2) Grinnell Corp.
    - 3) McWane, Inc.; Kennedy Valve Div.
    - 4) Milwaukee Valve Co., Inc.
    - 5) Nibco, Inc.
    - 6) Victaulic Co. of America.
  - j. Fire-Protection-Service Valves:
    - 1) Central Sprink, Inc.
    - 2) Central Sprinkler Corp.
    - 3) Grinnell Corp.
    - 4) McWane, Inc.; Kennedy Valve Div.
    - 5) Nibco, Inc.
    - 6) Stockham Valves & Fittings, Inc.
    - 7) Victaulic Co. of America.
  - k. Keyed Couplings for Steel Piping:
    - 1) Central Sprink, Inc.
    - 2) Ductilic, Inc.
    - 3) Grinnell Corp.
    - 4) National Fittings, Inc.
    - 5) Star Pipe Products, Inc.; Star Fittings Div.
    - 6) Victaulic Co. of America.
  - l. Press-Seal Fittings for Steel Piping:
    - 1) Victaulic Co. of America.
- B. Piping Materials: Refer to 1.3 EXECUTION, "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- C. Pipes and Tubes:
- 1. Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 (DN150) and smaller, and Schedule 30 in NPS 8 (DN200) and larger.
  - 2. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 (DN125) and smaller and NFPA 13 specified wall thickness in NPS 6 to NPS 10 (DN150 to DN250).
- D. Pipe and Tube Fittings:
- 1. Cast-Iron Threaded Fittings: ASME B16.4.
  - 2. Malleable-Iron Threaded Fittings: ASME B16.3.
  - 3. Steel, Threaded Couplings: ASTM A 865.
  - 4. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
  - 5. Steel Flanges and Flanged Fittings: ASME B16.5.

6. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47 (ASTM A 47M), malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.
- E. Joining Materials: Refer to Division 23 Section "Common Work Results for HVAC" for pipe-flange gasket materials and welding filler metals.
- F. Fire-Protection-Service Valves:
1. General: UL listed and FM approved, with minimum 175-psig (1200-kPa) nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.
  2. Gate Valves, NPS 2 (DN50) and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.
  3. Gate Valves, NPS 2-1/2 (DN65) and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
  4. Indicator-Post, Gate Valves: UL 262, iron body, bronze mounted, solid-wedge disc, and nonrising stem with operating nut and flanged ends.
  5. Swing Check Valves, NPS 2 (DN50) and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
  6. Swing Check Valves, NPS 2-1/2 (DN65) and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.
  7. Split-Clapper Check Valves, NPS 4 (DN100) and Larger: UL 312, cast-iron body with rubber seal, bronze-alloy discs, and stainless-steel spring and hinge pin.
- G. Specialty Valves:
1. Alarm Check Valves: UL 193, 175-psig (1200-kPa) working pressure, designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
    - a. Option: Grooved-end connections for use with keyed couplings.
    - b. Drip Cup Assembly: Pipe drain without valves, and separate from main drain piping.
    - c. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
  2. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4 (DN20), ball check device with threaded ends.
- H. Sprinklers:
1. Automatic Sprinklers: With heat-responsive element complying with the following:
    - a. UL 199, for applications except residential.
    - b. UL 1626, for residential applications.
    - c. UL 1767, for early suppression, fast-response applications.
  2. Sprinkler Types and Categories: Nominal 1/2" (12.7-mm) orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
  3. Sprinkler types, features, and options include the following:
    - a. Concealed ceiling sprinklers, including cover plate.

- b. Flow-control sprinklers, with automatic open and shut off feature.
  - c. Flush ceiling sprinklers, including escutcheon.
  - d. Pendent sprinklers.
  - e. Recessed sprinklers, including escutcheon.
  - f. Sidewall sprinklers.
  - g. Upright sprinklers.
- 4. Sprinkler Finishes: Chrome-plated
  - 5. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
    - a. Ceiling Mounting: Chrome-plated steel, one piece, flat.
    - b. Sidewall Mounting: Chrome-plated steel, one piece, flat.
  - 6. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.
- I. Fire Department Connections:
    - 1. Wall, Fire Department Connections: UL 405; cast-brass body with brass, wall, escutcheon plate; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking "AUTO SPKR."
      - a. Type: Flush mounting.
      - b. Escutcheon Plate: Rectangular.
      - c. Finish: Polished brass.
  - J. Alarm Devices:
    - 1. General: Types matching piping and equipment connections.
    - 2. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig (1725-kPa) pressure rating; and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
    - 3. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
  - K. Pressure Gages:
    - 1. Pressure Gages: UL 393, 3½"- to 4½"- (90- to 115-mm-) diameter dial with dial range of 0 to 250 psig (0 to 1725 kPa).

### 1.3. EXECUTION

- A. Piping Applications:
  - 1. Do not use welded joints with galvanized steel pipe.
  - 2. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

3. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
  4. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
  5. Underground Service-Entrance Piping: Use ductile-iron, push-on-joint pipe and fittings and restrained joints.
  6. Underground Service-Entrance Piping: Use ductile-iron, mechanical-joint pipe and fittings and restrained joints.
  7. Underground Service-Entrance Piping: Use ductile-iron, grooved-end pipe and fittings; ductile-iron, keyed couplings; and grooved joints.
  8. Sprinkler Feed Mains and Risers: Use the following:
    - a. NPS 6 (DN100) and Smaller: Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
  9. Wet-Pipe, Sprinkler Branch Piping: Use the following:
    - a. NPS 2 and Smaller: Standard-weight steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
- B. Valve Applications: Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13.
    - a. Shutoff Duty: Use gate valves.
  2. General-Duty Valves: For applications where UL-listed and FM-approved valves are not required by NFPA 13.
    - a. Shutoff Duty: Use gate, ball, or butterfly valves.
    - b. Throttling Duty: Use globe, ball, or butterfly valves.
- C. Joint Construction:
1. Refer to Section "Common Work Results for HVAC" for basic piping joint construction.
  2. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
  3. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- D. Service-Entrance Piping:
1. Refer to Section "Common Work Results for HVAC" for basic piping installation.
  2. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
    - a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

3. Install underground service-entrance piping according to NFPA 24 and with restrained joints.
  4. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
  5. Install unions adjacent to each valve in pipes NPS 2 (DN50) and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
  6. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 (DN65) and larger connections.
  7. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
  8. Install sprinkler piping with drains for complete system drainage.
  9. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to sprinkler risers when sprinkler branch piping is connected to sprinkler risers.
  10. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
  11. Install alarm devices in piping systems.
  12. Hangers and Supports: Comply with NFPA 13 for hanger materials and installation.
  13. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.
  14. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
  15. Install pressure gages on riser or feed main and at each sprinkler test connection. Include pressure gages with connection not less than NPS 1/4 (DN8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- E. Specialty Sprinkler Fitting Installation: Install specialty sprinkler fittings according to manufacturer's written instructions.
- F. Valve Installation:
1. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
  2. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
  3. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.
- G. Sprinkler Applications:
1. General: Use sprinklers according to the following applications:
    - a. Rooms without Ceilings: Pendent sprinklers.
    - b. Rooms with Suspended Ceilings: Concealed sprinklers.
    - c. Wall Mounting: Sidewall sprinklers.
    - d. Sprinkler Finishes: Use sprinklers with the following finishes:
      - 1) Upright, Pendent, and Sidewall Sprinklers: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view.
      - 2) Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
      - 3) Flush Sprinklers: Bright chrome, with painted white escutcheon.

- 4) Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
- H. Sprinkler Installation: Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.
- I. Connections:
1. Connect water supplies to sprinklers. Include backflow preventers.
  2. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
  3. Connect piping to specialty valves, specialties, fire department connections, and accessories.
  4. Electrical Connections: Power wiring is specified in Division 26.
  5. Connect alarm devices to fire alarm.
- J. Labeling and Identification:
1. Install labeling & pipe markers on equipment & piping according to requirements in NFPA 13 and in Division 23 Section "Common Work Results for HVAC."
  2. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 23 Section "Mechanical Identification."
- K. Field Quality Control:
1. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
  2. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
  3. Report test results promptly and in writing to Architect and authorities having jurisdiction.
- L. Cleaning:
1. Clean dirt and debris from sprinklers.
  2. Remove and replace sprinklers having paint other than factory finish.
- M. Protection: Protect sprinklers from damage until Substantial Completion.
- N. Commissioning:
1. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
  2. Verify that specified tests of piping are complete.
  3. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
  4. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
  5. Verify that potable-water supplies have correct types of backflow preventers.
  6. Verify that fire department connections have threads compatible with local fire department equipment.
  7. Fill wet-pipe sprinkler piping with water.
  8. Energize circuits to electrical equipment and devices.
  9. Coordinate with fire alarm tests. Operate as required.
- O. Demonstration:



1. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
2. Schedule demonstration with Owner with at least seven days' advance notice.

END 21 11 00.

## SECTION 22 05 00

### COMMON WORK RESULTS FOR PLUMBING

#### 1.1. GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.
- B. Summary:
1. This Section includes the following basic mechanical materials and methods to complement other Division 22 and 23 Sections.
    - a. Piping materials and installation instructions common to most piping systems.
    - b. Escutcheons
    - c. Dielectric fittings.
    - d. Flexible connectors.
    - e. Equipment nameplate data requirements.
    - f. Labeling and identifying mechanical systems
    - g. Field-fabricated metal and wood equipment supports.
    - h. Installation requirements common to equipment specification sections.
    - i. Mechanical demolition.
    - j. Cutting and patching.
    - k. Touchup painting and finishing.
  2. Pipe and pipe fitting materials are specified in Division 22 piping system Sections.
- C. Definitions:
1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
  2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
  3. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
  4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
  5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
  6. The following are industry abbreviations for plastic materials:
    - a. CPVC: Chlorinated polyvinyl chloride plastic.
    - b. NP: Nylon plastic.
    - c. PE: Polyethylene plastic.
    - d. PVC: Polyvinyl chloride plastic.
  7. The following are industry abbreviations for rubber materials:
    - a. CR: Chlorosulfonated polyethylene synthetic rubber.
    - b. EPDM: Ethylene propylene diene terpolymer rubber.

- D. Quality Assurance:
1. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
  2. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.
- E. Delivery, Storage, and Handling:
1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
  2. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
  3. Protect flanges, fittings, and piping specialties from moisture and dirt.
- F. Sequencing and Scheduling:
1. Coordinate mechanical equipment installation with other building components.
  2. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
  3. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
  4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
  5. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
  6. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
  7. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

## 1.2. PRODUCTS

- A. Pipe and Pipe Fittings:
1. Refer to individual Division 22 piping Sections for pipe and fitting materials and joining methods.
  2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- B. Joining Materials:
1. Solder Filler Metals: ASTM B 32.
    - a. Alloy Sn95 or Alloy Sn94: Approximately 95% tin and 5% silver, with 0.10% lead content.
    - b. Alloy E: Approximately 95% tin and 5% copper, with 0.10% maximum lead content.
    - c. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10% maximum lead content.

- d. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10% maximum lead content.
    - e. Alloy Sb5: 95% tin and 5% antimony, with 0.20% maximum lead content.
  - 2. Solvent Cements: Manufacturer's standard solvent cements for the following:
    - a. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 3. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
    - a. Sleeve: ASTM A 126, Class B, gray iron.
    - b. Followers: Malleable iron or ASTM A 536 ductile iron.
    - c. Gaskets: Rubber.
    - d. Bolts and Nuts: AWWA C111.
    - e. Finish: Enamel paint.
- C. Dielectric Fittings:
  - 1. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
  - 2. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
  - 3. Insulating Material: Suitable for system fluid, pressure, and temperature.
  - 4. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180° F (82° C).
  - 5. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig (1035-kPa) minimum working pressure as required to suit system pressures.
  - 6. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
    - a. Provide separate companion flanges and steel bolts and nuts for 150 psig (1035-kPa) minimum working pressure as required to suit system pressures.
  - 7. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225° F (107° C).
- D. Identifying Devices and Labels:
  - 1. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 22 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
  - 2. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
    - a. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
    - b. Location: Accessible and visible location.
  - 3. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1¼"- (30-mm-) high letters for ductwork and not less than ¾"- (19-mm-) high letters for access door signs and similar operational instructions.

- a. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
  - b. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.
4. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
- a. Fabricate in sizes required for message.
  - b. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
  - c. Punch for mechanical fastening.
  - d. Thickness:  $\frac{1}{8}$ ", unless otherwise indicated.
  - e. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
5. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
- a. Green: Cooling equipment and components.
  - b. Yellow: Heating equipment and components.
  - c. Yellow/Green: Combination cooling and heating equipment and components.
  - d. Brown: Energy reclamation equipment and components.
  - e. Blue: Equipment and components that do not meet any criteria above.
  - f. For hazardous equipment, use colors and designs recommended by ASME A13.1.
  - g. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
    - 1) Name and plan number.
    - 2) Equipment service.
    - 3) Design capacity.
    - 4) Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
  - h. Size: Approximate  $2\frac{1}{2}$ " by 4" (65 by 100 mm) for control devices, dampers, and valves; and  $4\frac{1}{2}$ " by 6" (115 by 150 mm) for equipment.
6. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
- a. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

### 1.3. EXECUTION

#### A. Piping Systems – Common Requirements:

- 1. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion,

- pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
2. Install components with pressure rating equal to or greater than system operating pressure.
  3. Install piping free of sags and bends.
  4. Install piping to allow application of insulation plus 1" (25-mm) clearance around insulation.
  5. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
  6. Install couplings according to manufacturer's written instructions.
  7. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
  8. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
    - a. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
    - b. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
    - c. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
    - d. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
      - 1) Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
      - 2) Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
      - 3) Align threads at point of assembly.
      - 4) Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
      - 5) Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
  9. Piping Connections: Make connections according to the following, unless otherwise indicated:
    - a. Install unions, in piping 2" NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2" NPS or smaller threaded pipe connection.
    - b. Install flanges, in piping 2½" NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
    - c. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
    - d. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

**B. Equipment Installation – Common Requirements:**

1. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
2. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
3. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

4. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
  5. Install equipment giving right of way to piping installed at required slope.
  6. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.
- C. Labeling and Identifying:
1. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
    - a. Stenciled Markers: According to ASME A13.1.
    - b. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
    - c. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior non-concealed locations:
      - 1) Near each valve and control device.
      - 2) Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
      - 3) Near locations if pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
      - 4) At access doors, manholes, and similar access points that permit view of concealed piping.
      - 5) Near major equipment items and other points of origination and termination.
      - 6) Spaced at maximum of 50' (15-m) intervals along each run. Reduce intervals to 25' (7.5 m) in congested areas of piping and equipment.
      - 7) On piping above removable acoustical ceilings, except omit intermediately spaced markers.
  2. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.
    - a. Lettering Size: Minimum ¼"- (6.4-mm-) high lettering for name of unit if viewing distance is less than 24" (610 mm), ½"h- (12.7-mm-) high lettering for distances up to 72" (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
    - b. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
  3. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.
- D. Concrete Bases: Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."
- E. Demolition:
1. Disconnect, demolish, and remove Work specified in Division 22 Sections.

2. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
  3. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
  4. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2" beyond face of adjacent construction. Cap and patch surface to match existing finish.
  5. Removal: Remove indicated equipment from Project site.
  6. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.
- F. Cutting and Patching:
1. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
  2. Repair cut surfaces to match adjacent surfaces.

**END OF SECTION**



## SECTION 22 05 18

### PENETRATION FIRESTOPPING FOR PLUMBING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

##### 1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

##### 1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, piping, and other mechanical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Repetitive plumbing penetrations in fire-rated floor assemblies. Penetrations exist for the installation of tubs, showers, aerators and other plumbing fixtures.

##### 1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
  - 1. Section 03300 - Cast-In-Place Concrete
  - 2. Section 04200 - Masonry Work
  - 3. Section 07840 – Firestopping
  - 4. Section 09250 - Gypsum Drywall Systems
  - 5. Section 13080 - Sound, Vibration and Seismic Control
  - 6. Section 13900 - Fire Suppression and Supervisory Systems
  - 7. Section 15050 - Basic Mechanical Materials and Methods
  - 8. Section 15250 - Mechanical Insulation
  - 9. Section 15300 - Fire Protection
  - 10. Section 15400 - Plumbing
  - 11. Section 16050 - Basic Electrical Materials and Methods

##### 1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:
  - a. Firestop Devices (XHJI)
  - b. Fire Resistance Ratings (BXRH)
  - c. Through-Penetration Firestop Systems (XHEZ)
  - d. Fill, Voids, or Cavity Material (XHHW)
  - e. Forming Materials (XHKU)
- D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- E. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials."
- G. All major building codes: ICBO, SBCCI, BOCA, and IBC.
- H. NFPA 101 - Life Safety Code

#### 1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

#### 1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.

- C. Submit material safety data sheets provided with product delivered to job-site.

#### 1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
- C. The work is to be installed by a contractor with at least one of the following qualifications:
  - FM 4991 Approved Contractor
  - UL Approved Contractor
  - Accredited Fire Stop Specialty Contractor
- D. Firm with not less than 3 years experience with fire stop installation.
- E. Successfully completed not less than 3 comparable scale projects using similar systems.

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Scheduling
  - 1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
  - 2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## **PART 2 - PRODUCTS**

### **2.01 FIRESTOPPING - GENERAL**

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
- D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 3. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
- E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- F. Mold Resistance: Provide penetration firestoppping with mold and mildew resistance rating of 0 as determined by ASTM G21.

### **2.02 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers per section 22 00 01 plumbing approved manufacturers.

### **2.03 MATERIALS**

- A. Use only firestop products that have been UL 1479 or ASTM E 814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems) penetrating concrete floors and/or gypsum walls, refer to referenced products:
  - 1. Hilti Cast-In Place Firestop Device (CP 680-P)
    - a. Add Aerator Adaptor when used in conjunction with aerator system.
  - 2. Hilti Tub Box Kit (CP 681) for use with tub installations.
  - 3. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
  - 4. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.
  - 5. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
  - 6. Hilti Firestop Block (CFS-BL)
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), refer to referenced products:
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - 2. Hilti Fire Foam (CP 620)
  - 3. Hilti Flexible Firestop Sealant (CP 606)
- D. Sealants or caulking materials for use with sheet metal ducts, refer to referenced products:
  - 1. Hilti Flexible Firestop Sealant (CP 606)
  - 2. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- E. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, refer to referenced products:
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- F. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, refer to referenced products:
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - 2. Hilti Fire Foam (CP 620)
  - 3. Hilti Flexible Firestop Sealant (CP 606)
- G. Non-curing, re-penetrable, intumescent putty or foam materials for use with flexible cable or cable bundles, refer to referenced products:
  - 1. Hilti Firestop Putty Stick (CP 618)
  - 2. Hilti Firestop Plug (CFS-PL)
- H. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), refer to referenced products:
  - 1. Hilti Firestop Collar (CP 643N)
  - 2. Hilti Firestop Collar (CP 644)

3. Hilti Wrap Strips (CP 648E/648S)
- I. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, refer to referenced products:
  1. Hilti Firestop Mortar (CP 637)
  2. Hilti Firestop Block (CFS-BL)
  3. Hilti Fire Foam (CP 620)
  4. Hilti Firestop Board (CP 675T)
- J. Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, refer to referenced products:
  1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Board (CP 675T)
- K. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, refer to referenced products:
  1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Plug (CFS-PL)
- L. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E 814 which is equal to the time rating of construction being penetrated.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  1. Verify penetrations are properly sized and in suitable condition for application of materials.
  2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  5. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 COORDINATION**

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

### 3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.
  - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
  - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
  - 3. Protect materials from damage on surfaces subjected to traffic.

### 3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

### 3.05 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration location on the entire project.
  - A.1 The Documentation Form for through penetrations is to include:
    - 1. A Sequential Location Number
    - 2. The Project Name
    - 3. Date of Installation
    - 4. Detailed description of the penetrations location
    - 5. Tested System or Engineered Judgment Number
    - 6. Type of assembly penetrated
    - 7. A detailed description of the size and type of penetrating item
    - 8. Size of opening
    - 9. Number of sides of assemblies addressed
    - 10. Hourly rating to be achieved
    - 11. Installers Name
- B. Copies of these documents are to be provided to the general contractor at the completion of the project.
- C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone

seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's Name, address, and phone number.
3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
4. Date of Installation.
5. Through-Penetration firestop system manufacturer's name.
6. Installer's Name.

D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:

1. Create multiple projects/ facilities, add/create/ remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.
2. Define data to track using pre-defined input fields or creating custom input fields as desired.
3. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.
4. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.
5. Annotate (mark) location of penetration on 2D floor plan.
6. Create reports by filtering data and utilizing report templates.
7. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application and cloud-based system.
8. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.

Permanently attach identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes.

Reference Software: Hilti CFS-DM, from Hilti Inc., Tulsa, OK. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: [www.us.hilti.com](http://www.us.hilti.com) or [www.hilti.ca.com](http://www.hilti.ca.com)



1. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

### 3.06 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

### 3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

- A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

**END OF SECTION**

## SECTION 22 05 53

### IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

#### 1.1 GENERAL

- A. Summary: This section includes:
  - 1. Nameplates
  - 2. Tags
  - 3. Pipe markers
  - 4. Labels
  
- B. References:
  - 1. American Society of Mechanical Engineers:
    - a. ASME A13.1 - Scheme for the Identification of Piping Systems.
  
  - 2. National Fire Protection Association:
    - a. NFPA 99 - Standard for Health Care Facilities.
  
- C. Submittals:
  - 1. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  - 2. Product Data: Submit manufacturers catalog literature for each product required.
  - 3. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
  - 4. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
  - 5. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
  
- D. Closeout Submittals:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
  - 2. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.
  
- E. Quality Assurance:
  - 1. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
  - 2. Maintain one copy of each document on site.
  
- F. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
  - 2. Installer: Company specializing in performing Work of this section with minimum three years experience.
  
- G. Field Measurements: Verify field measurements prior to fabrication.

## 1.2. PRODUCTS

- A. Nameplates:
  - 1. Manufacturers:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Tags:
  - 1. Plastic Tags:
    - a. Manufacturers:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
  - 2. Tag Chart: Typewritten letter size list of applied tags and location.
- C. Pipe Markers:
  - 1. Color and Lettering: Conform to ASME A13.1.
  - 2. Plastic Pipe Markers:
    - a. Manufacturers:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
  - 3. Plastic Tape Pipe Markers:
    - a. Manufacturers:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
  - 4. Plastic Underground Pipe Markers:
    - a. Manufacturers:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- D. Labels:
  - 1. Description: Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification.

## 1.3. EXECUTION

- A. Preparation:
  - 1. Degrease and clean surfaces to receive adhesive for identification materials.
  - 2. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

- B. Installation:
1. Apply stencil painting in accordance with Section 09 90 00.
  2. Install identifying devices after completion of coverings and painting.
  3. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
  4. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
  5. Install tags using corrosion resistant chain. Number tags consecutively by location.
  6. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
  7. Identify water heaters, pumps, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.
  8. Identify control panels and major control components outside panels with plastic nameplates.
  9. Identify valves in main and branch piping with tags.
  10. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

## SECTION 22 11 00

### Facility Water Distribution

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary:
  - 1. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.
  - 2. Related Sections include the following:
    - a. Division 22 Section "Plumbing Specialties" for water distribution piping specialties.
- C. Definitions:
  - 1. CPVC: Chlorinated polyvinyl chloride plastic.
  - 2. PA: Polyamide (nylon) plastic.
  - 3. PE: Polyethylene plastic.
  - 4. PEX: Crosslinked polyethylene plastic.
  - 5. PP: Polypropylene plastic.
  - 6. PVC: Polyvinyl chloride plastic.
- D. Performance Requirements:
  - 1. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
    - a. Domestic Water Distribution Piping: 125psi.
- E. Submittals:
  - 1. Product Data: For pipe, tube, fittings, and couplings.
- F. Quality Assurance:
  - 1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
  - 2. Comply with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances," and NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for combined fire-protection and domestic water service piping to building.
  - 3. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

#### 1.2. PRODUCTS

- A. Piping Materials: Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Copper Tubing:
  - 1. Soft Copper Tube: ASTM B 88, Types K and L (ASTM B 88M, Types A and B), water tube, annealed temper.

- a. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
  - b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
  - c. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
2. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.
- a. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
  - b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
  - c. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
  - d. Copper, Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
    - 1) Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.
- C. Valves, General:
- 1. Refer to Part 3 "Valve Applications" Article for applications of valves.
  - 2. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.
  - 3. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.
  - 4. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
  - 5. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
  - 6. Valve Actuators:
    - a. Handwheel: For valves other than quarter-turn types.
    - b. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller, except plug valves.
  - 7. Extended Valve Stems: On insulated valves.
  - 8. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
- D. Copper-Alloy Ball Valves:
- 1. Manufacturers:
    - a. Three-Piece, Copper-Alloy Ball Valves:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. Copper-Alloy Ball Valves, General: MSS SP-110.
  - 3. Three-Piece, Copper-Alloy Ball Valves: Brass or bronze body with full -port, chrome-plated bronze ball; PTFE or TFE <Insert other> seats; and 600-psig (4140-kPa) minimum CWP rating and blowout-proof stem.
  - 4. Refer to Section "Plumbing Specialties" for balancing and drain valves.

### 1.3. EXECUTION

- A. Piping Applications:
1. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
  2. Flanges may be used on aboveground piping, unless otherwise indicated.
  3. Aboveground Domestic Water Piping: Use any of the following piping materials for each size range:
    - a. NPS 1-1/2 (DN 40) and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.
    - b. NPS 2 (DN 50): Hard copper tube, Type L; copper pressure fittings; and soldered joints.
    - c. NPS 2-1/2 and up: Hard copper tube, Type L copper pressure fittings; and soldered joints.
  4. Underground Domestic Water Piping: Use any of the following piping materials for each size range:
    - a. NPS 3 and Smaller: Soft Copper tube, Type K; copper pressure fittings; and swaged joints.
    - b. NPS 4 and larger: Ductile Iron; mechanical joints.
- B. Valve Applications:
1. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
    - a. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
    - b. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
    - c. Hot-Water-Piping, Balancing Duty: Memory-stop balancing valves.
    - d. Drain Duty: Hose-end drain valves.
  2. Domestic Water Piping: Use the following types of valves:
    - a. Ball Valves, NPS 2 (DN 50) and Smaller: Three-piece, CWP rating, copper alloy.
    - b. Butterfly Valves, NPS 2-1/2 (DN 65) and Larger: Flangeless, 150-psig (1035-kPa) rating, ferrous alloy, with EPDM liner.
    - c. Spring Loaded Check Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 125, bronze.
    - d. Gate Valves, NPS 2-1/2 (DN 65) and Larger: Type I, Class 125, bronze-mounted cast iron.
- C. Piping Installation:
1. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.
  2. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 23 Section "Common Work Results for HVAC" for wall penetration systems.
  3. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service.
  4. Perform the following steps before operation:
    - a. Close drain valves, hydrants, and hose bibbs.
    - b. Open shutoff valves to fully open position.
    - c. Open throttling valves to proper setting.
    - d. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

- e. Remove and clean strainer screens. Close drain valves and replace drain plugs.
  - f. Remove filter cartridges from housings, and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
5. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
  6. Energize pumps and verify proper operation.
- D. Joint Construction:
1. Refer to Division 23 Section "Common Work Results for HVAC" for basic piping joint construction.
  2. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- E. Valve Installation:
1. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
    - a. Install hose-end drain valves at low points in water mains, risers, and branches.
    - b. Install stop-and-waste drain valves where indicated.
  2. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow.
- F. Hanger and Support Installation:
1. Install the following:
    - a. Vertical Piping: MSS Type 8 or Type 42, clamps.
    - b. Individual, Straight, Horizontal Piping Runs: According to the following:
      - 1) 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
      - 2) Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
      - 3) Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
    - c. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
    - d. Base of Vertical Piping: MSS Type 52, spring hangers.
  2. Support vertical piping and tubing at base and at each floor.
  3. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
  4. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
    - a. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
    - b. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
    - c. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
    - d. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
    - e. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.



5. Install supports for vertical copper tubing every 10 feet (3 m).
- G. Connections:
1. Drawings indicate general arrangement of piping, fittings, and specialties.
  2. Install piping adjacent to equipment and machines to allow service and maintenance.
  3. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.
  4. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:
    - a. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
    - b. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
    - c. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.
- H. Field Quality Control:
1. Inspect domestic water piping as follows:
    - a. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
      - 1) Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
    - b. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
    - c. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
  2. Test domestic water piping as follows:
    - a. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
    - b. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
    - c. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    - d. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
    - e. Prepare reports for tests and required corrective action.
- I. Adjusting: Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
1. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
  2. Adjust calibrated balancing valves to flows indicated.

- J.      Cleaning:
1.      Clean and disinfect potable domestic water piping as follows:
    - a.      Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
    - b.      Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
      - 1)      Flush piping system with clean, potable water until dirty water does not appear at outlets.
      - 2)      Fill and isolate system according to either of the following:
        - a)      Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        - b)      Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
      - 3)      Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
      - 4)      Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

2. Prepare and submit reports of purging and disinfecting activities.
3. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

**END OF SECTION**

## SECTION 22 11 19

### PLUMBING SPECIALITIES

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary:
1. This Section includes the following plumbing specialties:
    - a. Backflow preventers.
    - b. Dishwasher air-gap fittings.
    - c. Thermostatic water mixing valves.
    - d. Water tempering valves.
    - e. Strainers
    - f. Outlet boxes.
    - g. Washer-supply outlets.
    - h. Wheel-handle wall hydrants.
    - i. Nondraining nonfreeze post hydrants.
    - j. Trap seal primer valves.
    - k. Drain valves.
    - l. Backwater valves.
    - m. Miscellaneous piping specialties.
    - n. Sleeve penetration systems.
    - o. Cleanouts
    - p. Floor drains.
    - q. Trench drains.
    - r. Roof drains.
    - s. Thermal Balancing Valve
- C. Definitions:
1. The following are industry abbreviations for plastic piping materials:
    - a. ABS: Acrylonitrile-butadiene-styrene plastic.
    - b. PE: Polyethylene plastic.
    - c. PUR: Polyurethane plastic.
    - d. PVC: Polyvinyl chloride plastic.
- D. Performance Requirements:
1. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
    - a. Domestic Water Piping: 125 psig (860 kPa)
    - b. Sanitary Waste and Vent Piping: 10-foot head of water (30 kPa).
    - c. Storm Drainage Piping: 10-foot head of water (30 kPa).
    - d. Force-Main Piping: 100 psig (690 kPa)
- E. Submittals:
1. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
    - a. Backflow preventers and water regulators.
    - b. Balancing valves, water filters, and strainers.

- c. Thermostatic water mixing valves and water tempering valves.
  - d. Water hammer arresters, air vents, and trap seal primer valves and systems.
  - e. Drain valves, hose bibbs, hydrants, and hose stations.
  - f. Outlet boxes and washer-supply outlets.
  - g. Backwater valves, cleanouts, floor drains, open receptors, trench drains, and roof drains.
  - h. Sleeve penetration systems.
- 2. Shop Drawings: Diagram power, signal, and control wiring.
  - 3. Field test reports.
  - 4. Maintenance Data: For plumbing specialties to include in maintenance manuals. Include the following:
    - a. Backflow preventers and water regulators.
    - b. Water filters.
    - c. Thermostatic water mixing valves and water tempering valves.
    - d. Trap seal primer valves and systems.
    - e. Hose stations and hydrants.
- F. Quality Assurance:
- 1. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
  - 2. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
  - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 4. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
  - 5. NSF Compliance:
    - a. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.
    - b. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

## 1.2. PRODUCTS

- A. Manufacturers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
- B. Backflow Preventers:
  - 1. Manufacturers:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. General: ASSE standard, backflow preventers.
    - a. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
    - b. Interior Components: Corrosion-resistant materials.
    - c. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.

- d. Strainer: On inlet, if indicated.
  - 3. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
  - 4. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
  - 5. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and two independent check valves with intermediate atmospheric vent.
  - 6. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves.
    - a. Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
  - 7. Antisiphon-Pressure-Type Vacuum Breakers: ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.
    - a. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
  - 8. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3-gpm (0.19-L/s) flow and applications with up to 10-foot head of water (30-kPa) back pressure. Include two check valves; intermediate atmospheric vent; and nonremovable, ASME B1.20.7, garden-hose threads on outlet.
  - 9. Back-Siphonage Backflow Vacuum Breakers: ASSE 1056, suitable for continuous pressure and backflow applications. Include shutoff valves, check valve, test cocks, and vacuum vent.
- C. Thermostatic Water Mixing Valves:
- 1. Manufacturers:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. General: ASSE 1017, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot- and cold-water-supply inlets, adjustable temperature setting, and thermometer.
    - a. Type: Bimetal thermostat, operation and pressure rating 125 psig (860 kPa) minimum.
    - b. Type: Liquid-filled motor, operation and pressure rating 100 psig (690 kPa) minimum.
  - 3. Thermostatic Water Mixing Valves: Unit, with the following:
    - a. Piping, valves, and unions.
- D. Strainers:
- 1. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch (1.2-mm) round perforations, unless otherwise indicated.

- a. Pressure Rating: 125-psig (860-kPa) minimum steam working pressure, unless otherwise indicated.
  - b. NPS 2 (DN 50) and Smaller: Bronze body, with female threaded ends.
  - c. NPS 2-1/2 (DN 65) and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved, epoxy coating and flanged ends.
  - d. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.
    - 1) Drain: Pipe plug.
  - e. T-Pattern Strainers: Malleable-iron or ductile-iron body with grooved ends; access end cap with drain plug and access coupling with rubber gasket.
  - f. Basket Strainers: Bolted flange or clamp cover, and basket with lift-out handle.
- E. Drain Valves:
- 1. Drain Valves: MSS SP-110, NPS 3/4 (DN 20) ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
    - a. Inlet: Threaded or solder joint.
    - b. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.
  - 2. Hose-End Drain Valve: MSS SP-80, gate valve, Class 125, ASTM B 62 bronze body, with NPS 3/4 (DN 20) threaded or solder-joint inlet and ASME B1.20.7, garden-hose threads on outlet and cap. Hose bibbs are prohibited for this application.
  - 3. Stop-and-Waste Drain Valves: MSS SP-110, ball valve, rated for 200-psig (1380-kPa) minimum CWP or MSS SP-80, Class 125, gate valve; ASTM B 62 bronze body, with NPS 1/8 (DN 6) side drain outlet and cap.
- F. Miscellaneous Piping Specialties:
- 1. Hose Bibbs: Heavy commercial, freezeproof type.
  - 2. Air Vents: Float type for automatic air venting.
    - a. Bolted Construction: Bronze body with replaceable, corrosion-resistant metal float and stainless-steel mechanism and seat; [NPS 1/2 (DN 15)] minimum inlet; 125-psig (860-kPa) minimum pressure rating at 140 deg F (60 deg C); and threaded vent outlet.
    - b. Welded Construction: Stainless-steel body with corrosion-resistant metal float, stainless-steel mechanism and seat, threaded NPS 3/8 (DN 10) minimum inlet, 150-psig (1035-kPa) minimum pressure rating, and threaded vent outlet.
  - 3. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting, joined with ASTM C 564, rubber gaskets.
  - 4. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.
    - a. NPS 2 (DN 50): 4-inch- (100-mm-) minimum water seal.
    - b. NPS 2-1/2 (DN 65) and Larger: 5-inch- (125-mm-) minimum water seal.
  - 5. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
  - 6. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and

bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.

7. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
8. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.
9. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch (25-mm) enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.
10. Expansion Joints: ASME A112.21.2M, assembly with cast-iron body with bronze sleeve, packing gland, and packing; of size and end types corresponding to connected piping.
11. Conductor Nozzles: Bronze body with threaded inlet for connected conductor size, and bronze wall flange with mounting holes.

G. Sleeve Penetration Systems:

1. Available Manufacturers:

a. Manufacturers:

- 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.

b. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.

- 1) Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
- 2) Stack Fitting: ASTM A 48 (ASTM A 48M), gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.

- a) Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

H. Cleanouts:

1. Cleanouts:

a. Application: Floor cleanout all cleanout or installation in exposed piping

b. Products:

- 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.

c. Body or Ferrule Material: Cast iron.

d. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.

e. Frame and Cover Shape: Round

f. Top Loading Classification: Medium Duty.

I. Floor Drains:

1. Floor Drains, Refer to drawing schedule:

a. Products:

- 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.

J. Roof Drains:



- a. Cast-Iron, Large-Sump, General-Purpose Roof Drains
    - 1) Standard: ASME A112.6.4, for general-purpose roof drains.
    - 2) Body Material: Cast iron.
    - 3) Dimension of Body: Nominal 14-inch (357-mm).
    - 4) Outlet: Bottom.
    - 5) Dome Material: Cast iron or PE
    - 6) Water Dam: when specified: 2 inches (51 mm) high.
  - b. Products:
    - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
- K. Adjustable Thermal Balancing Valve:
- 1. Manufacturers:
    - a. Reference: Caleffi 1164.
    - b. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. General: Adjustable thermal balancing valve for automatic balancing of domestic hot-water systems. Will automatically adjust flow based on desired setpoint temperature.
  - 3. Standards:
    - a. NSF/ANSI/CAN 372 low-lead
    - b. NSF/ANSI/CAN 61
    - c. International Plumbing Code
  - 4. Maximum Working Pressure: 230 psig
  - 5. Adjustable Working Temperature
    - a. 95-140 deg
  - 6. Hydraulic Seals: Peroxide-cured EPDM.
  - 7. Adjustable Balancing Cartridge: Stainless steel and copper.
  - 8. Factory Setting 130 deg F

### 1.3. EXECUTION

- A. Installation:
- 1. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
  - 2. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
    - a. Locate backflow preventers in same room as connected equipment or system.
    - b. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
    - c. Do not install bypass piping around backflow preventers.
  - 3. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
  - 4. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.

5. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
6. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
7. Install expansion joints on vertical risers, stacks, and conductors if indicated.
8. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
  - a. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
  - b. Locate at each change in direction of piping greater than 45 degrees.
  - c. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
  - d. Locate at base of each vertical soil and waste stack.
9. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
10. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
11. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
12. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
13. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.
14. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  - a. Position floor drains for easy access and maintenance.
  - b. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
    - 1) Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
    - 2) Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
    - 3) Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
  - c. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  - d. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
15. Fasten recessed-type plumbing specialties to reinforcement built into walls.
16. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.
17. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 22 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.
18. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

19. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- B. Connections:
1. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
  2. Install piping adjacent to equipment to allow service and maintenance.
  3. Connect plumbing specialties to piping specified in other Division 22 Sections.
  4. Ground equipment.
  5. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
  6. Connect plumbing specialties and devices that require power according to Division 26 Sections.
- C. Protection:
1. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
  2. Place plugs in ends of uncompleted piping at end of each day or when work stops.

**END OF SECTION**

## SECTION 22 13 00

### FACILITY SANITARY SEWERAGE

#### 1.1 GENERAL

##### A. Summary:

1. Section Includes:
  - a. Sanitary sewer piping buried within 5 feet of building.
  - b. Sanitary sewer piping above grade.
  - c. Unions and flanges.
  - d. Pipe hangers and supports.
  - e. Bedding and cover materials.
2. Related Sections:
  - a. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of concrete specified by this section.
  - b. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
  - c. Section 08 31 13 - Access Doors and Frames: Product requirements for access doors for placement by this section.
  - d. Section 22 07 00 - Plumbing Insulation: Product and execution requirements for pipe insulation.
  - e. Section 31 20 00 - Earthwork: Soils for backfill in trenches. Aggregates for Earthwork: Aggregate for backfill in trenches. Trenching: Execution requirements for trenching required by this section.
  - f. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.

##### B. References:

1. American Society of Mechanical Engineers:
  - a. ASME A112.14.1 - Backwater Valves.
  - b. ASME A112.14.3 - Grease Interceptors.
  - c. ASME A112.14.4 - Grease Removal Devices.
  - d. ASME A112.21.1 - Floor Drains.
  - e. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
  - f. ASME B16.3 - Malleable Iron Threaded Fittings.
  - g. ASME B16.4 - Gray Iron Threaded Fittings.
  - h. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
  - i. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
  - j. ASME B31.9 - Building Services Piping.
2. ASTM International:
  - a. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
  - b. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - c. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
  - d. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

- e. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
  - f. ASTM A536 - Standard Specification for Ductile Iron Castings.
  - g. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.
  - h. ASTM B32 - Standard Specification for Solder Metal.
  - i. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
  - j. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
  - k. ASTM B75 - Standard Specification for Seamless Copper Tube.
  - l. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  - m. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
  - n. ASTM B302 - Standard Specification for Threadless Copper Pipe.
  - o. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV).
  - p. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  - q. ASTM C443M - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric).
  - r. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
  - s. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  - t. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  - u. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  - v. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
  - w. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  - x. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  - y. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
  - z. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  - aa. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  - bb. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
  - cc. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
  - dd. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
3. Cast Iron Soil Pipe Institute:
- a. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
  - b. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

4. Manufacturers Standardization Society of the Valve and Fittings Industry:
    - a. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
    - b. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
    - c. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
    - d. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
    - e. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
    - f. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
    - g. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
  5. Plumbing and Drainage Institute:
    - a. PDI G101 - Standard - Testing and Rating Procedure for Grease Interceptors.
- C. Submittals:
1. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  2. Product Data:
    - a. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
    - b. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
    - c. Hangers and Supports: Submit manufacturers catalog information including load capacity.
    - d. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
  3. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.
  4. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- D. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
  2. Project Record Documents: Record actual locations of equipment and clean-outs.
  3. Operation and Maintenance Data: Submit frequency of treatment required for interceptors. Include, spare parts lists, exploded assembly views for pumps and equipment.
- E. Qualifications:
1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
  2. Installer: Company specializing in performing Work of this section with minimum three years experience.
- F. Delivery, Storage, and Handling:
1. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
  2. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

- G. Environmental Requirements:
  - 1. Section 01 60 00 - Product Requirements.
  - 2. Do not install underground piping when bedding is wet or frozen.
- H. Field Measurements: Verify field measurements prior to fabrication.
- I. Warranty:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

## 1.2. PRODUCTS

- A. Sanitary Sewer Piping, Buried Within 5 Feet of Building:
  - 1. Cast Iron Soil Pipe: ASTM A74, service weight, bell and spigot ends.
    - a. Fittings: Cast iron, ASTM A74.
    - b. Joints: Neoprene compression gasket conforming to ASTM C564 or ASATM B29, pure lead and oakum.
    - c. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International®
  - 2. Cast Iron Soil Pipe For Aggressive DWV Sanitary Waste (Only as Indicated on Drawings)
    - a. Pipe and Fittings: ASTM A74
    - b. Joints: Neoprene compression gasket conforming to ASTM C564.
    - c. The inside of each pipe shall be reamed prior to coating to decrease the coefficient of friction. The pipe coating shall consist of chemically deposited zinc-phosphate pretreatment layer followed by an electrically deposited, high performance cathodic epoxy coating, and finally an electrically deposited, high performance anodic epoxy top coat. The fitting coating shall consist of a chemically deposited zinc-phosphate pretreatment layer followed by an electrically deposited, high performance cathodic epoxy coating, and finally an epoxy acrylic powder top coat.
    - d.
  - 3. PVC Pipe: ASTM D2665 and ASTM D1785, polyvinyl chloride (PVC) material. If allowed by local code.
    - a. Fittings: ASTMD2665, PVC.
    - b. Joints: ASTM D2855, solvent weld with primer conforming to ASTM F656 and ASTM D2564 solvent cement.
- B. Sanitary Sewer Piping, Above Grade:
  - 1. Cast Iron Pipe: CISPI 301, hub-less, service weight.
    - a. Fittings: Cast iron, CISPI 301.
    - b. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
    - c. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International®
    - d. All standard duty Hubless couplings shall be certified by NSF International®
  - 2. Copper Pipe: ASTM B42.

- a. Fittings: ASME B16.23, cast bronze, or ASME B16.29 wrought copper.
    - b. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.
  - 3. PVC Pipe: ASTM D2665 and ASTM D1785, polyvinyl chloride (PVC) material. If allowed by local code.
    - a. Fittings: ASTM D2665, PVC.
    - b. Joints: ASTM D2855, solvent weld with primer conforming to ASTM F656 and ASTM D2564 solvent cement.
- C. Unions and Flanges:
  - 1. Unions for Pipe 2 inches and Smaller:
    - a. Copper Piping: Class 150, bronze unions with soldered.
    - b. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
    - c. PVC Piping: PVC.
  - 2. Flanges for Pipe 2-1/2 inches and Larger:
    - a. Copper Piping: Class 150, slip-on bronze flanges.
    - b. PVC Piping: PVC flanges.
    - c. Gaskets: 1/16 inch thick preformed neoprene gaskets.
  - 3. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.
- D. Pipe Hangers and Supports:
  - 1. Manufacturers:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. Drain, Waste, and Vent: Conform to ASME B31.9.
  - 3. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
  - 4. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
  - 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 6. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
  - 7. Wall Support for Pipe Sizes 3 inches and Larger: Welded steel bracket and wrought steel clamp.
  - 8. Vertical Support: Steel riser clamp.
  - 9. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 10. Copper Pipe Support: Carbon-steel, copper-plated adjustable ring.

### 1.3. EXECUTION

- A. Examination:
  - 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
  - 2. Verify excavations are to required grade, dry, and not over-excavated.



- B. Preparation:
1. Ream pipe and tube ends. Remove burrs.
  2. Remove scale and dirt, on inside and outside, before assembly.
  3. Prepare piping connections to equipment with flanges or unions.
  4. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- C. Installation – Hangers and Supports:
1. Inserts:
    - a. Provide inserts for placement in concrete forms.
    - b. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
    - c. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
    - d. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
    - e. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
  2. Pipe Hangers and Supports:
    - a. Install in accordance with ASME B31.9 ASTM F708 and MSS SP 89.
    - b. Support horizontal piping as scheduled.
    - c. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
    - d. Place hangers within 12 inches of each horizontal elbow.
    - e. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
    - f. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
    - g. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
    - h. Provide copper plated hangers and supports for copper piping.
    - i. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
    - j. Install hangers adjacent to motor driven equipment with vibration isolation; refer to Section 21 05 48.
- D. Installation – Buried Piping Systems:
1. Verify connection size, location, and invert are as indicated on Drawings.
  2. Establish elevations of buried piping with not less than 4 ft of cover.
  3. Establish minimum separation of from piping in accordance with code.
  4. Remove scale and dirt on inside of piping before assembly.
  5. Install all thermoplastic piping in accordance with ASTM D2321.
  6. Excavate pipe trench in accordance with Section 31 23 16.
  7. Install pipe to elevation required for fall.
  8. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches loose depth.
  9. Install pipe on prepared clean sand bedding. 4" depth minimum.
  10. Route pipe in straight line.
  11. Pipe Cover and Backfilling:
    - a. Backfill trench in accordance with Section 31 23 23.

- b. Maintain optimum moisture content of fill material to attain required compaction density.
- c. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
- d. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
- e. Do not use wheeled or tracked vehicles for tamping.

12. Install Work in accordance with

E. Installation – Above Ground Piping:

- 1. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
- 2. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
- 3. Encase exterior cleanouts in concrete flush with grade.
- 4. Install floor cleanouts at elevation to accommodate finished floor.
- 5. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- 6. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- 7. Install piping to maintain headroom. Do not spread piping, conserve space.
- 8. Group piping whenever practical at common elevations.
- 9. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 21 05 16.
- 10. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.
- 11. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- 12. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 90 00.
- 13. Install bell and spigot pipe with bell end upstream.
- 14. Sleeve pipes passing through partitions, walls and floors.
- 15. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section.
- 16. Support drainage piping at every joint.
- 17. PVC is not allowed in above ceiling return air plenum spaces. Contractor shall use cast iron, listed CPVC or other approved method.

F. Field Quality Control:

- 1. Section: Field inspecting, testing, adjusting, and balancing.
- 2. Test sanitary waste and vent piping system in accordance with applicable code local authority having jurisdiction.

G. Schedules:

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING (Feet)	HANGER ROD DIAMETER (Inches)

Cast Iron (All Sizes)	5	5/8
Cast Iron (All Sizes) with 10 foot length of pipe	10	5/8
Copper Tube, 1-1/4 inches and smaller	6	1/2
Copper Tube, 1-1/2 inches and larger	10	1/2
PVC (All Sizes)	4	3/8
Steel, 3 inches and smaller	12	1/2
Steel, 4 inches and larger	12	5/8

*Note for Cast Iron Pipe: Provide close to joint on barrel. Also provide hanger at each change of direction and each branch connection.*

**END OF SECTION**

## SECTION 22 40 00

### PLUMBING FIXTURES

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary: This Section includes plumbing fixtures and related components.
- C. Definitions:
  - 1. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
  - 2. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- D. Submittals:
  - 1. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.
  - 2. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
  - 3. Maintenance Data: For plumbing fixtures to include in maintenance manuals specified in Division 1.
- E. Quality Assurance:
  - 1. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
    - a. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
  - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 3. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.
  - 4. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.
  - 5. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
  - 6. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

7. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
8. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
  - a. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
  - b. Hand Sinks: NSF 2 construction.
  - c. Plastic Laundry Trays: ANSI Z124.6.
  - d. Plastic Mop-Service Basins: ANSI Z124.6.
  - e. Plastic Sinks: ANSI Z124.6.
  - f. Plastic Whirlpool Bathtubs: ANSI Z124.1 and ASME A112.19.7M.
  - g. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
  - h. Stainless-Steel Fixtures Other Than Service Sinks: ASME A112.19.3M.
  - i. Vitreous-China Fixtures: ASME A112.19.2M.
  - j. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
  - k. Water-Closet, Flushometer Tank Trim: ASSE 1037.
9. Comply with the following applicable standards and other requirements specified for lavatory faucets:
  - a. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
  - b. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
  - c. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
  - d. Faucet Hose: ASTM D 3901.
  - e. Faucets: ASME A112.18.1M.
  - f. Hose-Connection Vacuum Breakers: ASSE 1011.
  - g. Hose-Coupling Threads: ASME B1.20.7.
  - h. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
  - i. NSF Materials: NSF 61.
  - j. Pipe Threads: ASME B1.20.1.
  - k. Supply and Drain Fittings: ASME A112.18.1M.
10. Comply with the following applicable standards and other requirements specified for shower faucets:
  - a. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
  - b. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
  - c. Faucets: ASME A112.18.1M.
  - d. Hand-Held Showers: ASSE 1014.
  - e. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
  - f. Hose-Coupling Threads: ASME B1.20.7.
  - g. Manual-Control Antiscald Faucets: ASTM F 444.
  - h. Pipe Threads: ASME B1.20.1.
  - i. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
  - j. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
11. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
  - a. Atmospheric Vacuum Breakers: ASSE 1001.
  - b. Brass and Copper Supplies: ASME A112.18.1M.
  - c. Manual-Operation Flushometers: ASSE 1037.
  - d. Plastic Tubular Fittings and Piping: ASTM F 409.
  - e. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

- f. Tubular Brass Drainage Fittings and Piping: ASME A112.18.1M.
12. Comply with the following applicable standards and other requirements specified for miscellaneous components:
- a. Floor Drains: ASME A112.21.1M.
  - b. Grab Bars: ASTM F 446.
  - c. Hose-Coupling Threads: ASME B1.20.7.
  - d. Off-Floor Fixture Supports: ASME A112.6.1M.
  - e. Pipe Threads: ASME B1.20.1.
  - f. Plastic Toilet Seats: ANSI Z124.5.
  - g. Supply and Drain Protective Shielding Guards: ICC A117.1.
- F. Coordination: Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

## 1.2. PRODUCTS

- A. Toilet Seats:
- 1. Toilet Seats: Solid plastic.
    - a. Configuration: Open front without cover.
    - b. Size: Elongated
    - c. Class: Heavy-duty commercial.
    - d. Color: White
    - e. Material: Solid Plastic
- B. Protective Shielding Guards: Protective Shielding Guard, Manufactured, plastic enclosure for covering for hot- and cold-water supplies and trap and drain piping and complying with ADA requirements.
- C. Fixture Supports: Lavatory Support, Type I, lavatory carrier with exposed arms and tie rods, Type II, lavatory carrier with concealed arms and tie rod or Type III, lavatory carrier with hanger plate and tie rod. Include steel uprights with feet.
- 1. Accessible Fixture Support: Include rectangular steel uprights.
- D. Water Closets:
- 1. Water Closets: vitreous-china fixture designed for flushometer valve operation. Refer to drawing schedules.
    - a. Products:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Style: Flush valve siphon jet.
      - 1) Bowl Type: Elongated with siphon-jet design.
        - a) Design Consumption: 1.6 gal./flush (6 L/flush).
      - 2) Color: White.
      - 3) Design Consumption: 1.6 gal./flush (6 L/flush) .

- E. Urinal:
  - 1. Vitreous-china fixture designed for flushometer valve operation. Refer to drawing schedules.
    - a. Products:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Style: Flush valve wall mount.
      - 1) washout design.
      - 2) Color: White.
- F. Design Consumption: 0.5 gal./flush (2 L/flush)
- G. Lavatories:
  - 1. Lavatories: Accessible, vitreous-china fixture.
    - a. Faucet Hole Punching: Three, 2-inch (51-mm) centers, holes.
    - b. Products:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - c.
    - d. Faucet Hole Location: Top.
    - e. Color: White
    - f. Supplies: NPS 3/8 (DN 10) chrome-plated copper with stops.
    - g. Drain: Grid.
    - h. Drain Piping: NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40) chrome-plated cast-brass trap; thick tubular brass waste to wall; and wall escutcheon.
    - i. Protective Shielding Guards: as scheduled.
  - 2. Bar Sinks, Residential, single-compartment, counter-mounting, stainless-steel fixture.
    - a. Products:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Drain: 3-1/2-inch (89-mm) crumb cup.
    - c. Drain Piping: NPS 1-1/2 (DN 40) chrome-plated cast-brass trap, 0.045-inch- (1.1-mm-) thick tubular brass waste to wall, and wall escutcheon.
- H. Kitchen Sinks
  - 1. Residential, two-compartment, stainless-steel fixture. Refer to drawing schedules.
    - a. Products:
      - 1) Refer to section 22 0 01 for Plumbing Approved Manufacturers.
    - b. Food disposer, 1/2hp, as scheduled.
    - c. Accessories as scheduled
- I. Service Basins:
  - 1. Service Basins: Flush-to-wall, floor-mounting precast terrazzo or heavy plastic basin with rim guard.
    - a. Products:
      - 1) Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - b. Refer to schedule.

- c. Accessories. As scheduled.
- d. Drain: Grid with NPS 3 (DN 80) outlet.

### 1.3. EXECUTION

#### A. Examination:

1. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
2. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

#### B. Fixture Installation:

1. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
2. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
  - a. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  - b. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  - c. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
3. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
4. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
5. Install wall-hanging fixtures with tubular waste piping attached to supports.
6. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
7. Install counter-mounting fixtures in and attached to casework.
8. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.
9. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
  - a. Exception: Use ball, gate, or globe valve if stops are not specified with fixture.
10. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
11. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
12. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
13. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
14. Install toilet seats on water closets.
15. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.



16. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.
17. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
18. Install shower, flow-control fittings with specified maximum flow rates in shower arms.
19. Install traps on fixture outlets.
  - a. Exception: Omit trap on fixtures with integral traps.
  - b. Exception: Omit trap on indirect wastes, unless otherwise indicated.
20. Install disposer in outlet of sinks indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
21. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.
22. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 23 Section "Common Work Results for HVAC" for escutcheons.
23. Set shower receptors, and service basins in leveling bed of cement grout.
24. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

C. Connections:

1. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Connect water supplies from water distribution piping to fixtures.
3. Connect drain piping from fixtures to drainage piping.
4. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.
5. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.
6. Ground Equipment: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Field Quality Control:

1. Verify that installed fixtures are categories and types specified for locations where installed.
2. Check that fixtures are complete with trim, faucets, fittings, and other specified components.
3. Inspect installed fixtures for damage. Replace damaged fixtures and components.
4. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
5. Install fresh batteries in sensor-operated mechanisms.

E. Adjusting:

1. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

2. Adjust water pressure at faucets, shower valves, and flushometer valves to produce proper flow and stream.
  3. Replace washers and seals of leaking and dripping faucets and stops.
- F. Cleaning:
1. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
    - a. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
    - b. Remove sediment and debris from drains.
- G. Protection:
1. Provide protective covering for installed fixtures and fittings.
  2. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

**END OF SECTION**

## SECTION 22 47 00

### DRINKING FOUNTAINS AND WATER COOLERS

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:

1. Drinking fountains.
2. Pressure water coolers.
3. Bottle water coolers.
4. Water-station water coolers.
5. Remote water coolers.
6. Fixture supports.

#### 1.3 DEFINITIONS

- A. Accessible Water Cooler: Fixture that can be approached and used by people with disabilities.
- B. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.
- C. Fitting: Device that controls flow of water into or out of fixture.
- D. Fixture: Drinking fountain or water cooler, unless one is specifically indicated.
- E. Remote Water Cooler: Electrically powered equipment for generating cooled drinking water.
- F. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

#### 1.4 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of fixture indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Maintenance Data: For fixtures to include in maintenance manuals specified in Division 1.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities; and Public Law 101-336, "Americans with Disabilities Act"; about fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in the U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about fixtures for people with disabilities.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

## 1.6 COORDINATION

- A. Coordinate roughing-in and final fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Water Coolers: Accessible, ARI 1010, Type PB, pressure with bubbler, Style W, wall-hanging fixture.
  - 1. Available Products:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
    - 2. Cabinet: Single or Bilevel with two attached cabinets, as indicated by schedule.
    - 3. Bubbler: One, with automatic stream regulator, located on each cabinet deck.
    - 4. Control: Push bar.
    - 5. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve and filter.
    - 6. Drain[s]: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.1M.
    - 7. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
      - a. Capacity: 8 gph (0.0084 L/s) of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
      - b. Electrical Characteristics: 120-V ac; single phase; 60 Hz.
  - 8. Support: As recommended by manufacturer.

- B. Water Coolers: ARI 1010, Type PB, pressure with bubbler, Style RE, recessed fixture.
  - 1. Products:
    - a. Refer to section 22 00 01 for Plumbing Approved Manufacturers.
  - 2. Cabinet: All stainless steel.
  - 3. Bubbler: One, with automatic stream regulator, located on deck.
  - 4. Control: Push bar.
  - 5. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve and filter.
  - 6. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.1M.
  - 7. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
    - a. Capacity: 8 gph (0.0084 L/s) of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
    - b. Electrical Characteristics: 120-V ac; single phase; 60 Hz.
  - 8. Ventilation Grille: Stainless steel.
  - 9. Support: Mounting frame for attaching to substrate.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.
- B. Examine walls and floors for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATIONS

- A. Use carrier off-floor supports for wall-hanging fixtures, unless otherwise indicated.
- B. Use mounting frames for recessed water coolers, unless otherwise indicated.
- C. Set freestanding and pedestal drinking fountains on floor.
- D. Set remote water coolers on floor, unless otherwise indicated.
- E. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

### 3.3 INSTALLATION

- A. Install off-floor supports affixed to building substrate and attach wall-hanging fixtures, unless otherwise indicated.
- B. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.
- C. Install fixtures level and plumb.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Refer to Division 15 Section "Valves" for general-duty valves.
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.
- G. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

#### 3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Ground equipment.
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

#### 3.5 FIELD QUALITY CONTROL

- A. Water-Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.
- B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- C. Report test results in writing.

#### 3.6 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.

B. Adjust water-cooler temperature settings.

3.7 CLEANING

A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

**END OF SECTION**

**SECTION 23 05 00  
COMMON WORK RESULTS FOR HVAC**

1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

Mechanical contractor to provide full as-built red line drawings to the GC and owner

B. Summary:

1. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.
  - a. Piping materials and installation instructions common to most piping systems.
  - b. Escutcheons
  - c. Dielectric fittings.
  - d. Flexible connectors.
  - e. Equipment nameplate data requirements.
  - f. Labeling and identifying mechanical systems.
  - g. Field-fabricated metal and wood equipment supports.
  - h. Installation requirements common to equipment specification sections.
  - i. Mechanical demolition.
  - j. Cutting and patching.
  - k. Touchup painting and finishing.

C. Definitions:

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
6. The following are industry abbreviations for plastic materials:
  - a. CPVC: Chlorinated polyvinyl chloride plastic.
  - b. NP: Nylon plastic.
  - c. PE: Polyethylene plastic.
  - d. PVC: Polyvinyl chloride plastic.
7. The following are industry abbreviations for rubber materials:
  - a. CR: Chlorosulfonated polyethylene synthetic rubber.



b. EPDM: Ethylene propylene diene terpolymer rubber.

D. SUBMITTALS

1. Welding certificates.
2. Certificates of Compliance for pressure vessels.
3. Submit shop drawings or cuts showing construction size, arrangement, operating clearances, performance characteristics and capacity of materials and equipment. Each item of equipment proposed shall be a standard catalog product of the approved manufacturer.
4. Samples, drawings, specifications, catalogs, etc., submitted for approval shall be properly labeled indicating specific service for which material or equipment is to be used.
5. Submit access door locations to the Architect for approval. Equipment requiring access doors shall not be installed prior to approval of access door locations.
6. Coordination Drawings:
  - a. Provide coordination drawings in accordance with Division 1 Section "Project Management and Coordination". Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components (i.e. electrical, plumbing, structural and architectural work). Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
    - a) Planned piping layout, including valve and specialty locations.
    - b) Clearances for installation and maintaining insulation.
    - c) Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
    - d) Equipment and accessory service connections and support details.
    - e) Fire-rated wall and floor penetrations.
    - f) Sizes and location of required concrete pads and bases.
    - g) Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
    - h) Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
    - i) See Division 23, Section "Metal Ducts" for ductwork installation drawing requirements.
    - j) Reflected Ceiling Plans:
      - i. Ceiling suspension assembly members.
      - ii. Other systems installed in same space as ducts.
      - iii. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
      - iv. Ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, access panels, and special molding.
      - v. Refer to architectural ceiling plans for additional requirements.

- E. Quality Assurance:
1. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
  2. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.
- F. Delivery, Storage, and Handling:
1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
  2. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
  3. Protect flanges, fittings, and piping specialties from moisture and dirt.
- G. Sequencing and Scheduling:
1. Coordinate mechanical equipment installation with other building components.
  2. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
  3. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
  4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
  5. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
  6. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
  7. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

## 1.2. PRODUCTS

- A. Manufacturers:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Pipe and Pipe Fittings:
1. Refer to individual Sections for pipe and fitting materials and joining methods.
  2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- C. Joining Materials:
1. Solder Filler Metals: ASTM B 32.

- a. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
  - b. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.
  - c. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.
  - d. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.
  - e. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.
2. Solvent Cements: Manufacturer's standard solvent cements for the following:
    - a. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  3. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
    - a. Sleeve: ASTM A 126, Class B, gray iron.
    - b. Followers: Malleable iron or ASTM A 536 ductile iron.
    - c. Gaskets: Rubber
    - d. Bolts and Nuts: AWWA C111
    - e. Finish: Enamel paint.
- D. Dielectric Fittings:
1. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
  2. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
  3. Insulating Material: Suitable for system fluid, pressure, and temperature.
  4. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
  5. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig (1035-kPa) minimum working pressure as required to suit system pressures.
  6. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
    - a. Provide separate companion flanges and steel bolts and nuts for 150 psig (1035-kPa) minimum working pressure as required to suit system pressures.
  7. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
- E. Identifying Devices and Labels:
1. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
  2. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

- a. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
  - b. Location: Accessible and visible location.
3. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch- (30-mm-) high letters for ductwork and not less than 3/4-inch- (19-mm-) high letters for access door signs and similar operational instructions.
  - a. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
  - b. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.
4. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
  - a. Fabricate in sizes required for message.
  - b. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
  - c. Punch for mechanical fastening.
  - d. Thickness: 1/8 inch, unless otherwise indicated.
  - e. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
5. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
  - a. Green: Cooling equipment and components.
  - b. Yellow: Heating equipment and components.
  - c. Yellow/Green: Combination cooling and heating equipment and components.
  - d. Brown: Energy reclamation equipment and components.
  - e. Blue: Equipment and components that do not meet any criteria above.
  - f. For hazardous equipment, use colors and designs recommended by ASME A13.1.
  - g. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
    - 1) Name and plan number.
    - 2) Equipment service.
    - 3) Design capacity.
    - 4) Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
  - h. Size: Approximate 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; and 4-1/2 by 6 inches (115 by 150 mm) for equipment.
6. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations

indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

- a. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

### 1.3. EXECUTION

#### A. Piping Systems – Common Requirements:

1. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Install components with pressure rating equal to or greater than system operating pressure.
3. Install piping free of sags and bends.
4. Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.
5. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
6. Install couplings according to manufacturer's written instructions.
7. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
8. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
  - a. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
  - b. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
  - c. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
  - d. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
    - 1) Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    - 2) Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    - 3) Align threads at point of assembly.
    - 4) Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    - 5) Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
9. Piping Connections: Make connections according to the following, unless otherwise indicated:

- a. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
- b. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
- c. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
- d. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

B. Equipment Installation – Common Requirements:

1. Install equipment to provide maximum possible headroom if mounting heights are not indicated.
2. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
3. Install equipment level and plumb, parallel, and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
4. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
5. Install equipment giving right of way to piping installed at required slope.
6. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

C. Labeling and Identifying:

1. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
  - a. Stenciled Markers: According to ASME A13.1.
  - b. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
  - c. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
    - 1) Near each valve and control device.
    - 2) Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    - 3) Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
    - 4) At access doors, manholes, and similar access points that permit view of concealed piping.
    - 5) Near major equipment items and other points of origination and termination.
    - 6) Spaced at maximum of 50-foot (15-m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in congested areas of piping and equipment.
    - 7) On piping above removable acoustical ceilings, except omit intermediately spaced markers.
2. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.

- a. Lettering Size: Minimum 1/4-inch- (6.4-mm-) high lettering for name of unit if viewing distance is less than 24 inches (610 mm), 1/2-inch- (12.7-mm-) high lettering for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
    - b. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
  3. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.
- D. Concrete Bases: Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."
- E. Cutting and Patching:
1. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
  2. Repair cut surfaces to match adjacent surfaces.

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END OF SECTION



**SECTION 23 08 18**  
**PENETRATION FIRESTOPPING FOR HEATING, AIR CONDITIONING, AND VENTILATION**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, piping, and other mechanical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Repetitive plumbing penetrations in fire-rated floor assemblies. Penetrations exist for the installation of tubs, showers, aerators and other plumbing fixtures.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
  - 1. Section 03300 - Cast-In-Place Concrete
  - 2. Section 04200 - Masonry Work
  - 3. Section 07840 – Firestopping
  - 4. Section 09250 - Gypsum Drywall Systems
  - 5. Section 13080 - Sound, Vibration and Seismic Control
  - 6. Section 13900 - Fire Suppression and Supervisory Systems
  - 7. Section 15050 - Basic Mechanical Materials and Methods
  - 8. Section 15250 - Mechanical Insulation
  - 9. Section 15300 - Fire Protection
  - 10. Section 15400 - Plumbing
  - 11. Section 16050 - Basic Electrical Materials and Methods

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"

- C. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
  - 1. UL Fire Resistance Directory:
    - a. Firestop Devices (XHJI)
    - b. Fire Resistance Ratings (BXRH)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)
    - e. Forming Materials (XHKU)
- D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- E. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials."
- G. All major building codes: ICBO, SBCCI, BOCA, and IBC.
- H. NFPA 101 - Life Safety Code

#### 1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

#### 1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.

- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

#### 1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
- C. The work is to be installed by a contractor with at least one of the following qualifications:
  - FM 4991 Approved Contractor
  - UL Approved Contractor
  - Hilti Accredited Fire Stop Specialty Contractor
- D. Firm with not less than 3 years experience with fire stop installation.
- E. Successfully completed not less than 3 comparable scale projects using similar systems.

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Scheduling
  - 1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
  - 2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## **PART 2 - PRODUCTS**

### **2.01 FIRESTOPPING - GENERAL**

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
- D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 3. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
- E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

### **2.02 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
1. Hilti, Inc., Tulsa, Oklahoma  
800-879-8000  
www.us.hilti.com
  2. Provide products from the above acceptable manufacturer; *no substitutions will be accepted.*

## 2.03 MATERIALS

- A. Use only firestop products that have been UL 1479 or ASTM E 814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems) penetrating concrete floors and/or gypsum walls, the following products are acceptable:
1. Hilti Cast-In Place Firestop Device (CP 680-P) for use with combustible penetrants.
  2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
  3. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.
  4. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
  5. Hilti Firestop Block (CFS-BL)
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  2. Hilti Fire Foam (CP 620)
  3. Hilti Flexible Firestop Sealant (CP 606)
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti Flexible Firestop Sealant (CP 606)
  2. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- E. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- F. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

2. Hilti Fire Foam (CP 620)
  3. Hilti Flexible Firestop Sealant (CP 606)
- G. Non-curing, re-penetrable, intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Firestop Putty Stick (CP 618)
  2. Hilti Firestop Plug (CFS-PL)
- H. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti Firestop Collar (CP 643N)
  2. Hilti Firestop Collar (CP 644)
  3. Hilti Wrap Strips (CP 648E/648S)
- I. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Mortar (CP 637)
  2. Hilti Firestop Block (CFS-BL)
  3. Hilti Fire Foam (CP 620)
  4. Hilti Firestop Board (CP 675T)
- J. Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Board (CP 675T)
- K. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Plug (CFS-PL)
- L. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E 814 which is equal to the time rating of construction being penetrated.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

### 3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

### 3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.
  1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
  2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
  3. Protect materials from damage on surfaces subjected to traffic.

### 3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

### 3.05 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration location on the entire project.
  - A.1 The Documentation Form for through penetrations is to include:

1. A Sequential Location Number
  2. The Project Name
  3. Date of Installation
  4. Detailed description of the penetrations location
  5. Tested System or Engineered Judgment Number
  6. Type of assembly penetrated
  7. A detailed description of the size and type of penetrating item
  8. Size of opening
  9. Number of sides of assemblies addressed
  10. Hourly rating to be achieved
  11. Installers Name
- B. Copies of these documents are to be provided to the general contractor at the completion of the project.
- C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's Name, address, and phone number.
  3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
  4. Date of Installation.
  5. Through-Penetration firestop system manufacturer's name.
  6. Installer's Name.
- D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:
1. Create multiple projects/ facilities, add/create/ remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.
  2. Define data to track using pre-defined input fields or creating custom input fields as desired.
  3. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.



4. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.
5. Annotate (mark) location of penetration on 2D floor plan.
6. Create reports by filtering data and utilizing report templates.
7. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application and cloud-based system.
8. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.

Permanently attach Hilti identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes.

Acceptable Software: Hilti CFS-DM, from Hilti Inc., Tulsa, OK. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: [www.us.hilti.com](http://www.us.hilti.com) or [www.hilti.ca.com](http://www.hilti.ca.com)

1. Substitutions: Not permitted.
2. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

### 3.06 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

### 3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

- A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

**END OF SECTION**

## SECTION 23 05 29

### HVAC HANGERS AND SUPPORTS

#### 1. GENERAL

##### 1.1 SECTION INCLUDES

- A. Pipe, ductwork, and equipment hangers, supports, anchors, saddles and shields.
- B. Mechanical flashing.
- C. Equipment curbs.
- D. Mechanical sleeves and seals.
- E. Flashing and sealing equipment and pipe stacks.
- F. Sealants, firestop insulation, putty and compounds.
- G. Pipe Stands

##### 1.2 REFERENCE SECTION 23 05 00 FOR THE FOLLOWING:

- A. Quality assurance.
- B. References.
- C. Submittals.
- D. Operation and maintenance manuals.
- E. Project record documents.
- F. Delivery, storage, and handling.

#### 2. PRODUCTS

##### 2.1 PIPE HANGERS AND SUPPORTS

- A. Hydronic Piping:
  - 1. Conform to International Mechanical Code, ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89 as applicable.
- B. Steam and Steam Condensate Piping:
  - 1. Conform to International Mechanical Code, ASME B31.1, ASTM F708, MSS SP58, MSS SP69, MSS SP89, as applicable.
- C. Refrigerant Piping
  - 1. Conform to International Mechanical Code, ASME B31.1, ASTM F708, MSS SP58, MSS SP69, MSS SP89, as applicable.
- D. Hangers and Supports:

1. Hangers for Hot and Cold Pipe Sizes 1/2 to 1-1/2 Inch, Carbon steel, adjustable swivel, band type.
2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches; Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
14. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
15. Roof Support for Hot and Cold Pipe: See PIPE STANDS section below.
16. Hangers for insulated pipe shall be enlarged to compensate for insulation thickness so that hangers support insulation. See Section 23 07 19.
17. See Section 23 05 48 for vibration isolation hangers and supports if applicable.

## 2.2 DUCTWORK HANGERS AND SUPPORTS

- A. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- B. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- C. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Trapeze and Riser Supports:
  1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  2. Supports for Exposed Stainless-Steel Ducts: Stainless-steel shapes and plates.

## 2.3 ACCESSORIES

- A. Hanger Rods: ASTM A36 steel or galvanized threaded both ends, threaded one end, or continuous threaded.
  1. Ductwork: Use double nuts and lock washers on threaded rod supports.

## 2.4 INSERTS

- A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## 2.5 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Metal Counterflashing: 22 gage galvanized steel.
- C. Flexible Flashing: 47 mil thick sheet buty; compatible with roofing.
- D. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

## 2.6 EQUIPMENT CURBS

- A. Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match roof insulation, 1-1/2 inch thick insulation, factory installed wood nailer. Minimum 18 inch height, unless specified otherwise.

## 2.7 SLEEVES

- A. Sleeves for Pipes through Fire Rated Floors and Walls: Schedule 40 steel pipe.
- B. Sleeves for Pipes Through Non-fire Rated Floors and Walls: 18 gage galvanized steel.
- C. Sleeves for Ductwork: Galvanized steel.

## 2.8 SEALANTS, FIRESTOP INSULATION, PUTTY, AND COMPOUNDS

- A. Firestopping Insulation: Glass fiber type, non-combustible, UL listed.
- B. Firestop Putty: Non-hardening, non-shrinking, UL listed.
- C. Firestop Compounds: Cementitious material, non-shrinking, UL listed.
- D. Sealants:
  - 1. Non fire/smoke rated partitions: Acrylic or silicone based caulking.
  - 2. Fire/smoke rated partitions: Silicone based caulking, UL listed.

## 2.9 MECHANICAL SEALS

- A. Mechanical Seals: Modular mechanical type, consisting of interlocking EPDM synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with type 316 stainless

steel bolts and reinforced plastic polymer pressure plates which cause rubber sealing elements to expand when tightened, providing a watertight and gas-tight seal and electrical insulation.

1. Provide high-temperature silicone links rated for 400 Deg. F for steam and condensate applications.
2. A sleeve shall be provided for each mechanical seal.
  - a. Thermoplastic sleeves: Sleeve shall have smooth walls and shall be made of molded non-metallic high density polyethylene (HDPE) with an integral solid water stop, Advance Products & Systems Model PWS or equivalent.
  - b. Steel sleeves: Sleeve shall have smooth walls, shall be made of Schedule 40 steel with an integral welded solid water stop, and shall have corrosion-resistant coating, Advance Products & Systems Model GWS or equivalent.

## 2.10 PIPE STANDS (ROOF)

- A. General Requirements for Pipe Stands: Shop or field –fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. High-Type, Single-Pipe Stand:
  1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
  2. Base: Plastic
  3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
  4. Horizontal Member: Cadmium-plated-steel or stainless-steel with plastic or stainless-steel, roller-type pipe support.
- D. High-Type, Multiple-Pipe Stand:
  1. Description: Assembly of Bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
  2. Bases: One or more; plastic
  3. Vertical Members: Two or more protective-coated-steel channels.
  4. Horizontal member: Protective-coated-steel channel.
  5. Pipe Supports: galvanized-steel, clevis-type pipe hangers.
- E. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

## 3. EXECUTION

### 3.1 INSTALLATION

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

### 3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.

- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

### 3.3 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Support fire protection systems piping independently from other piping systems. Fire main piping may be trapezed with other piping systems. Coordinate trapeze hangers with the Sprinkler Contractor.
  - 1. Reference sections 21 05 29 and 22 05 29 for additional information regarding fire protection and plumbing piping supports and hangers.
- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- G. Support vertical piping at every floor and at intervals of no more than 12 ft. Support vertical cast iron pipe at each floor at hub.
- H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Provide copper plated hangers and supports for non-insulated copper pipe.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Prime coat steel hangers and supports in the mechanical room and other exposed areas. Refer to the Architectural reflected ceiling plans for location of exposed ceilings. Hangers and supports located in attic space, crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- M. Adjust hangers to distribute loads equally on attachments and to achieve specified pipe slopes.
- N. Saddles, Shields and Inserts
  - 1. Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
  - 2. Install protective shields MSS Type 40 on cold piping that has vapor barrier. Shields shall span an arc of 180 degrees (360 degrees on trapeze hangers with U-bolt clamps) and shall have dimensions in inches not less than the following:

<u>NPS</u>	<u>LENGTH</u>	<u>THICKNESS</u>
1 through 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 through 14	24	0.075
16 through 24	24	0.105

3. Pipes 8 inches and larger shall have wood inserts.
4. Insert materials shall be at least as long as the protective shield.  
Provide manufacturer-recommended saddles, inserts, and/or shields where cellular foam insulation is used. The removal of sections of cellular foam insulation for the purpose of pipe support is not acceptable.

### 3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  1. Where practical, install concrete inserts before placing concrete.
  2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum

Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.5 INSTALLATION OF ANCHORS

- A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and with AWS Standards D1.1.
- C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.
- D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

### 3.6 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls and floors.
- B. Seal floor, shower, mop sink, etc. drains watertight to adjacent materials.
- C. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

### 3.7 SLEEVES

- A. Provide pipe and duct sleeves at all fire/smoke rated partitions, exterior wall penetrations and wall penetrations into exposed areas. Pipe and duct sleeves are not required for penetrations through non-rated concealed partitions.
- B. Wall sleeves shall not be used to support pipes or ducts.
- C. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Size so as to allow for continuous insulation wrapping through sleeve.
- E. Sleeves through floors shall extend a minimum 2" above the finish floor level. Sleeves through walls should be flush with wall surface.
- F. Where piping or ductwork penetrate non-rated ceilings or walls, close off space between pipe or duct and adjacent work with urethane rod stock and caulk air tight.
- G. Seal pipe and duct penetrations through non-rated floors.



1. Where piping is not located in a rated shaft and it penetrates a single non-rated floor, close off space between pipe and adjacent work with urethane rod stock and caulk air tight.
  2. Where piping is not located in a rated shaft and it penetrates multiple non-rated floors, close off space between pipe and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound.
  3. Where ductwork is not located in a rated shaft and it penetrates a single non-rated floor, close off space between duct and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound.
  4. Where ductwork is not located in a rated shaft and it penetrates multiple non-rated floors, close off space between duct and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound. Install fire damper in duct at each floor level. Ductwork containing fume exhaust air shall not be provided with fire dampers.
- H. Where piping or ductwork penetrate rated floor, ceiling, or wall, close off space between pipe or duct with appropriate fire rated sealant, insulation, putty or compound. Refer to the Drawings for fire/smoke rated wall locations and the appropriate ratings.
- I. Provide on ductwork close fitting metal collar or escutcheon covers on the side of penetration that are exposed to view.
- J. Install chrome plated steel escutcheons on piping at finished surfaces.
- K. Provide mechanical seals and sleeves through exterior wall and floor penetrations and 3 hour or higher fire rated partitions.
- L. All ductwork through exterior walls to be installed with flashing and counter flashing.

### 3.8 HANGER SCHEDULES

- A. Reference International Plumbing Code and International Mechanical Code where applicable.

END OF SECTION 23 05 29

## SECTION 23 05 93

### TESTING, ADJUSTING AND BALANCING FOR HVAC

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Testing adjusting and balancing of air systems.
  - 2. Testing adjusting and balancing of hydronic systems.
  - 3. Measurement of final operating condition of HVAC systems.
  - 4. Sound measurement of equipment operating conditions.
  - 5. Vibration measurement of equipment operating conditions.

##### 1.2 REFERENCES

- A. Associated Air Balance Council:
  - 1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
  - 1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
- C. Natural Environmental Balancing Bureau:
  - 1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Prior to commencing Work, submit proof of latest calibration date of each instrument.
- C. Test Reports: Indicate data on AABC MN-1 National Standards for Total System Balance forms.
- D. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- E. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, sample report forms and Copy of NEBB Certificate of Conformance Certification.
- F. Submit draft copies of report for review prior to final acceptance of Project.
- G. Furnish reports in binder manuals, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of flow measuring stations balancing valves and rough setting.
- C. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance ASHRAE 111 NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Maintain one copy of each document on site.
- C. Prior to commencing Work, calibrate each instrument to be used.

#### 1.6 QUALIFICATIONS

- A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years experience.
- B. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

#### 1.7 SEQUENCING

- A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

#### 1.8 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify systems are complete and operable before commencing work. Verify the following:
  - 1. Systems are started and operating in safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed, and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place or in normal position.
15. Service and balancing valves are open.

### 3.2 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.
- B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

### 3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Verify recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- E. Report defects and deficiencies noted during performance of services, preventing system balance.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.

- H. Check and adjust systems approximately six months after final acceptance and submit report.

### 3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities.
- B. Contractor shall verify motor loading (current draw) during full economizer, normal operation, and night operation. This applies to all fan motors supply, return, and power exhaust.
- C. Make air quantity measurements in main ducts by Pitot tube traverse of entire cross-sectional area of duct.
- D. Measure air quantities at air inlets and outlets.
- E. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts.
- F. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- G. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.
- H. Contractor shall replace motor sheaves as required to obtain balance. Contractor shall not be responsible for motor replacement.
- I. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- J. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.
- K. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- L. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- M. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- N. Measure building static pressure and adjust supply, return, and exhaust air systems to obtain required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near building entries.
- O. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

- P. For variable air volume system powered units set volume controller to airflow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable-air-volume temperature control.
- Q. On fan powered VAV boxes, adjust airflow switches for proper operation.

### 3.6 WATER SYSTEM PROCEDURE

- A. Adjust water systems, after air balancing, to obtain design quantities.
- B. Use calibrated fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in system.
- C. Adjust systems to obtain specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open or in normal position to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, simulate full flow in one part by temporary restriction of flow to other parts.

### 3.7 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
  - 1. Fire Pumps.
  - 2. Plumbing Pumps.
  - 3. HVAC Pumps.
  - 4. Air Cooled Water Chillers.
  - 5. Air Coils.
  - 6. Terminal Heat Transfer Units.
  - 7. Air Handling Units.
  - 8. Fans.
  - 9. Air Filters.
  - 10. Air Terminal Units.
  - 11. Air Inlets and Outlets.
- B. Report Forms
  - 1. Title Page:
    - a. Name of Testing, Adjusting, and Balancing Agency
    - b. Address of Testing, Adjusting, and Balancing Agency
    - c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
    - d. Project name
    - e. Project location
    - f. Project Architect

- g. Project Engineer
- h. Project Contractor
- i. Project altitude
- j. Report date
- 2. Summary Comments:
  - a. Design versus final performance
  - b. Notable characteristics of system
  - c. Description of systems operation sequence
  - d. Summary of outdoor and exhaust flows to indicate building pressurization
  - e. Nomenclature used throughout report
  - f. Test conditions
- 3. Instrument List:
  - a. Instrument
  - b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Range
  - f. Calibration date
- 4. Electric Motors:
  - a. Manufacturer
  - b. Model/Frame
  - c. HP/BHP and kW
  - d. Phase, voltage, amperage; nameplate, actual, no load
  - e. RPM
  - f. Service factor
  - g. Starter size, rating, heater elements
  - h. Sheave Make/Size/Bore
- 5. V-Belt Drive:
  - a. Identification/location
  - b. Required driven RPM
  - c. Driven sheave, diameter and RPM
  - d. Belt, size and quantity
  - e. Motor sheave diameter and RPM
  - f. Center to center distance, maximum, minimum, and actual
- 6. Pump Data:
  - a. Identification/number
  - b. Manufacturer
  - c. Size/model
  - d. Impeller
  - e. Service
  - f. Design flow rate, pressure drop, BHP and kW
  - g. Actual flow rate, pressure drop, BHP and kW
  - h. Discharge pressure
  - i. Suction pressure
  - j. Total operating head pressure
  - k. Shut off, discharge and suction pressures
  - l. Shut off, total head pressure
- 7. Chillers:
  - a. Identification/number
  - b. Manufacturer
  - c. Capacity
  - d. Model number

- e. Serial number
  - f. Evaporator entering water temperature, design and actual
  - g. Evaporator leaving water temperature, design and actual
  - h. Evaporator pressure drop, design and actual
  - i. Evaporator water flow rate, design and actual
  - j. Condenser entering water temperature, design and actual
  - k. Condenser pressure drop, design and actual
  - l. Condenser water flow rate, design and actual
8. Cooling Coil Data:
- a. Identification/number
  - b. Location
  - c. Service
  - d. Manufacturer
  - e. Air flow, design and actual
  - f. Entering air DB temperature, design and actual
  - g. Entering air WB temperature, design and actual
  - h. Leaving air DB temperature, design and actual
  - i. Leaving air WB temperature, design and actual
  - j. Water flow, design and actual
  - k. Water pressure drop, design and actual
  - l. Entering water temperature, design and actual
  - m. Leaving water temperature, design and actual
  - n. Saturated suction temperature, design and actual
  - o. Air pressure drop, design and actual
9. Heating Coil Data:
- a. Identification/number
  - b. Location
  - c. Service
  - d. Manufacturer
  - e. Air flow, design and actual
  - f. Water flow, design and actual
  - g. Water pressure drop, design and actual
  - h. Entering water temperature, design and actual
  - i. Leaving water temperature, design and actual
  - j. Entering air temperature, design and actual
  - k. Leaving air temperature, design and actual
  - l. Air pressure drop, design and actual
10. Return Air/Outside Air Data:
- a. Identification/location
  - b. Design air flow
  - c. Actual air flow
  - d. Design return air flow
  - e. Actual return air flow
  - f. Design outside air flow
  - g. Actual outside air flow
  - h. Return air temperature
  - i. Outside air temperature
  - j. Required mixed air temperature
  - k. Actual mixed air temperature
  - l. Design outside/return air ratio
  - m. Actual outside/return air ratio
11. Exhaust Fan Data:
- a. Location



- b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Air flow, specified and actual
  - f. Total static pressure (total external), specified and actual
  - g. Inlet pressure
  - h. Discharge pressure
  - i. Sheave Make/Size/Bore
  - j. Number of Belts/Make/Size
  - k. Fan RPM
12. Duct Traverse:
- a. System zone/branch
  - b. Duct size
  - c. Area
  - d. Design velocity
  - e. Design air flow
  - f. Test velocity
  - g. Test air flow
  - h. Duct static pressure
  - i. Air temperature
  - j. Air correction factor
13. Duct Leak Test:
- a. Description of ductwork under test
  - b. Duct design operating pressure
  - c. Duct design test static pressure
  - d. Duct capacity, air flow
  - e. Maximum allowable leakage duct capacity times leak factor
  - f. Test apparatus
    - 1) Blower
    - 2) Orifice, tube size
    - 3) Orifice size
    - 4) Calibrated
  - g. Test static pressure
  - h. Test orifice differential pressure
  - i. Leakage
14. Air Monitoring Station Data:
- a. Identification/location
  - b. System
  - c. Size
  - d. Area
  - e. Design velocity
  - f. Design air flow
  - g. Test velocity
  - h. Test air flow
15. Flow Measuring Station:
- a. Identification/number
  - b. Location
  - c. Size
  - d. Manufacturer
  - e. Model number
  - f. Serial number
  - g. Design Flow rate
  - h. Design pressure drop

- i. Actual/final pressure drop
- j. Actual/final flow rate
- k. Station calibrated setting
- 16. Terminal Unit Data:
  - a. Manufacturer
  - b. Type, constant, variable, single, dual duct
  - c. Identification/number
  - d. Location
  - e. Model number
  - f. Size
  - g. Minimum static pressure
  - h. Minimum design air flow
  - i. Maximum design air flow
  - j. Maximum actual air flow
  - k. Inlet static pressure
- 17. Air Distribution Test Sheet:
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type
  - d. Terminal size
  - e. Area factor
  - f. Design velocity
  - g. Design air flow
  - h. Test (final) velocity
  - i. Test (final) air flow
  - j. Percent of design air flow
- 18. Sound Level Report:
  - a. Location
  - b. Octave bands - equipment off
  - c. Octave bands - equipment on
  - d. RC level - equipment on
- 19. Vibration Test:
  - a. Location of points:
    - 1) Fan bearing, drive end
    - 2) Fan bearing, opposite end
    - 3) Motor bearing, center (when applicable)
    - 4) Motor bearing, drive end
    - 5) Motor bearing, opposite end
    - 6) Casing (bottom or top)
    - 7) Casing (side)
    - 8) Duct after flexible connection (discharge)
    - 9) Duct after flexible connection (suction)
  - b. Test readings:
    - 1) Horizontal, velocity and displacement
    - 2) Vertical, velocity and displacement
    - 3) Axial, velocity and displacement
  - c. Normally acceptable readings, velocity and acceleration
  - d. Unusual conditions at time of test
  - e. Vibration source (when non-complying)

END OF SECTION

## SECTION 23 07 00

### HVAC INSULATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. HVAC piping insulation, jackets and accessories.
  2. HVAC equipment insulation, jackets and accessories.
  3. HVAC ductwork insulation, jackets, and accessories.
- B. Related Sections:
1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
  2. Section 09 90 00 - Painting and Coating: Execution requirements for painting insulation jackets and covering specified by this section.

##### 1.2 REFERENCES

- A. ASTM International:
1. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  3. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
  4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
  5. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
  6. ASTM C450 - Standard Practice for Prefabrication and Field Fabrication of Thermal Insulating Fitting Covers for NPS Piping, Vessel Lagging, and Dished Head Segments.
  7. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
  8. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
  9. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
  10. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  11. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  12. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
  13. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
  14. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  15. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

16. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
  17. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
  18. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
  19. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
  20. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  21. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
  22. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  23. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
  24. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
- B. Sheet Metal and Air Conditioning Contractors':
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- C. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- D. Underwriters Laboratories Inc.:
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
  2. UL 1978 - Standard for Safety for Grease Ducts.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- C. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

### 1.4 QUALITY ASSURANCE

- A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84, and NFPA 255.
- B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.
- C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.
- D. Maintain one copy of each document on site.

## 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.
- C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

## 1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year manufacturer warranty for man made fiber.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers per section 23 00 01 plumbing approved manufacturers.

## 2.2 PIPE INSULATION

- A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation.
  - 1. Thermal Conductivity: 0.23 at 75 degrees F (0.034 at 24 degrees C).
  - 2. Operating Temperature Range: 0 to 850 degrees F (minus 18 to 454 degrees C).
  - 3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
  - 4. Jacket Temperature Limit: minus 20 to 150 degrees F (minus 29 to 66 degrees C).
  
- B. TYPE P-2: ASTM C547, molded glass fiber pipe insulation.
  - 1. Thermal Conductivity: 0.23 at 75 degrees F (0.034 at 24 degrees C).
  - 2. Operating Temperature Range: 0 to 850 degrees F (minus 18 to 454 degrees C).
  
- C. TYPE P-3: ASTM C552-07, Cellular glass insulation
  - 1. Thermal Conductivity: 0.29 at 75 degrees F (0.040 at 24 degrees C).
  - 2. Operating Temperature Range: -450 to 900 degrees F
  - 3. Vapor Barrier Jacket: VentureClad 1577CW-E, 6 mil, 0 permability, embossed natural aluminum finish
  - 4. Jacket Temperature Limit: minus 30 to 300 degrees F
  
- D. TYPE P-4: ASTM C612; semi-rigid, fibrous glass board noncombustible.
  - 1. Thermal Conductivity: 0.27 at 75 degrees F (0.040 at 24 degrees C).
  - 2. Operating Temperature Range: 0 to 650 degrees F (minus 18 to 343 degrees C).
  
- E. TYPE P-5: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
  - 1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 25 degrees C).
  - 2. Operating Temperature Range: Range: Minus 70 to 180 degrees F (minus 57 to 82 degrees C).
  
- F. TYPE P-6: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
  - 1. Thermal Conductivity: 0.30 at 75 degrees F (0.043 at 24 degrees C).
  - 2. Maximum Service Temperature: 300 degrees F (149 degrees C).
  - 3. Operating Temperature Range: Range: Minus 58 to 300 degrees F (minus 50 to 149 degrees C).
  
- G. TYPE P-7: ASTM C534, Type I, flexible, nonhalogen, closed cell elastomeric insulation, tubular.
  - 1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 24 degrees C).
  - 2. Maximum Service Temperature: 250 degrees F (120 degrees C).
  - 3. Operating Temperature Range: Range: Minus 58 to 250 degrees F (minus 50 to 120 degrees C).
  
- H. TYPE P-8: ASTM C547, Type I or II, mineral fiber preformed pipe insulation, noncombustible.
  - 1. Thermal Conductivity: 0.23 at 75 degrees F (0.034 at 24 degrees C).
  - 2. Maximum Service Temperature: 1200 degrees F (649 degrees C).
  - 3. Canvas Jacket: UL listed, 6 oz/sq yd (220 g/sq m), plain weave cotton fabric treated with fire retardant lagging adhesive.
  
- I. TYPE P-9: ASTM C591, Type IV, polyisocyanurate foam insulation, formed into shapes for use as pipe insulation.

1. Density: 2.0 pounds per cubic foot (32 kg per cubic meter).
  2. Thermal Conductivity: 180-day aged value of 0.19 at 75 degrees F (0.027 at 24 degrees C).
  3. Operating Temperature Range: Range: Minus 297 to 300 degrees F (minus 183 to 149 degrees C).
  4. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied film of 6 mils (0.15 mm) thickness and water vapor permeance of 0.02 perms.
- J. TYPE P-10: ASTM C578, Type XIII, extruded polystyrene insulation, formed into shapes for use as pipe insulation.
1. Thermal Conductivity: 180-day aged value of 0.259 at 75 degrees F (0.037 at 24 degrees C).
  2. Operating Temperature Range: Range: Minus 297 to 165 degrees F (minus 183 to 74 degrees C).
  3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied film of 6 mils (0.15 mm) thickness and water vapor permeance of 0.02 perms.
- K. TYPE P-11: ASTM C533; Type I, hydrous calcium silicate pipe insulation, rigid molded white; asbestos free.
1. Thermal Conductivity: 0.45 at 200 degrees F (0.0650 at 93 degrees C).
  2. Operating Temperature Range: 140 to 1200 degrees F (60 to 649 degrees C).
- L. TYPE P-12: ASTM C547, molded glass fiber pipe insulation.
1. Thermal Conductivity: 0.23 at 75 degrees F (0.034 at 24 degrees C).
  2. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
  3. Operating Temperature Range: 0 to 850 degrees F (minus 18 to 454 degrees C).
  4. Canvas Jacket: UL listed, 6 oz/sq yd (220 g/sq m), plain weave cotton fabric treated with fire retardant lagging adhesive.

## 2.3 PIPE INSULATION JACKETS

- A. Vapor Retarder Jacket:
1. white Kraft paper with glass fiber yarn, bonded to aluminized film.
  2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- B. PVC Plastic Pipe Jacket:
1. Product Description: ASTM D1784, one piece molded type fitting covers and sheet material, off-white color.
  2. Thickness: 10 mil (0.25 mm).
  3. Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.
- C. ABS Plastic Pipe Jacket:
1. Jacket: One-piece molded type fitting covers and sheet material, off-white color.
  2. Minimum service temperature: -40 degrees F (-40 degrees C).
  3. Maximum service temperature of 180 degrees F (82 degrees C).
  4. Moisture vapor transmission: ASTM E96; 0.012 perm-inches.
  5. Thickness: 30 mil (0.76 mm).
  6. Connections: Brush on welding adhesive.

- D. Aluminum Pipe Jacket:
  - 1. ASTM B209.
  - 2. Thickness: 0.016 inch (0.40 mm) thick sheet.
  - 3. Finish: Smooth.
  - 4. Joining: Longitudinal slip joints and 2-inch (50 mm) laps.
  - 5. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
  - 6. Metal Jacket Bands: 3/8 inch (10 mm) wide.
  - 7. Stainless Steel Pipe Jacket: ASTM A167 Type 302 304 stainless steel.
  - 8. Thickness: 0.010 inch (0.25 mm) thick.
  - 9. Finish: Smooth.
  - 10. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.010 inch (0.25 mm) thick stainless steel.
  
- E. Field Applied Glass Fiber Fabric Jacket System:
  - 1. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
  - 2. Glass Fiber Fabric:
    - a. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
    - b. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.
    - c. Weave: 5 x 5.
  - 3. Indoor Vapor Retarder Finish:
    - a. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
    - b. Vinyl emulsion type acrylic, compatible with insulation, color.

## 2.4 PIPE INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Piping 1-1/2 inches (40 mm) diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.
- D. Piping 2 inches (50 mm) diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches (150 mm) long, matching thickness and contour of adjoining insulation.
- E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction with self-adhesive closure. Thickness to match pipe insulation.
- F. Tie Wire: 0.048-inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.
- G. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.
- H. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.
- I. Adhesives: Compatible with insulation.

## 2.5 EQUIPMENT INSULATION

- A. TYPE E-1: ASTM C553; glass fiber, flexible or semi-rigid, noncombustible.



1. Thermal Conductivity: 0.24 at 75 degrees F (0.032 at 24 degrees C).
  2. Operating Temperature Range: 0 to 450 degrees F (minus 18 to 232 degrees C).
  3. Density: 1.5 pound per cubic foot (24 kilograms per cubic meter).
- B. TYPE E-2: ASTM C612; glass fiber, rigid board, noncombustible with factory applied kraft aluminum foil jacket.
1. Thermal Conductivity: 0.24 at 75 degrees F (0.035 at 24 degrees C).
  2. Operating Temperature Range: 0 to 450 degrees F (minus 18 to 232 degrees C).
  3. Density: 3.0 pound per cubic foot (48 kilograms per cubic meter).
  4. Jacket Temperature Limit: minus 20 to 150 degrees F (minus 29 to 66 degrees C).
- C. TYPE E-3: ASTM C612; semi-rigid, fibrous glass board noncombustible, end grain adhered to jacket.
1. Thermal Conductivity: 0.27 at 75 degrees F (0.040 at 24 degrees C).
  2. Operating Temperature Range: 0 to 650 degrees F (minus 18 to 343 degrees C).
  3. Vapor Barrier Jacket: ASTM C1136, Type II, factory applied reinforced foil kraft with self-sealing adhesive joints.
  4. Jacket Temperature Limit: minus 20 to 150 degrees F (minus 29 to 66 degrees C).
- D. TYPE E-4: ASTM C612; semi-rigid, fibrous glass board noncombustible.
1. Thermal Conductivity: 0.27 at 75 degrees F (0.040 at 24 degrees C).
  2. Operating Temperature Range: 0 to 650 degrees F (minus 18 to 343 degrees C).
- E. TYPE E-5: ASTM C612; glass fiber, semi-rigid board, noncombustible.
1. Thermal Conductivity: 0.23 at 75 degrees F (0.033 at 24 degrees C).
  2. Maximum Operating Temperature: 850 degrees F (450 degrees C).
  3. Density: 3.0 pound per cubic foot (48 kilograms per cubic meter).
- F. TYPE E-6: ASTM C553; mineral fiber blanket, Type I.
1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 24 degrees C).
  2. Maximum Operating Temperature: 1000 degrees F (538 degrees C).
  3. Density: 1.0 pound per cubic foot (16 kilograms per cubic meter).
- G. TYPE E-7: ASTM C533; Type II, hydrous calcium silicate block insulation, asbestos free.
1. Thermal Conductivity: 0.45 at 200 degrees F (0.0650 at 93 degrees C).
  2. Operating Temperature Range: 140 to 1200 degrees F (60 to 649 degrees C).
- H. TYPE E-8: ASTM C534, Type II, flexible, closed cell elastomeric insulation, sheet.
1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 25 degrees C).
  2. Operating Temperature Range: Range: Minus 70 to 220 degrees F (minus 57 to 105 degrees C).
- I. TYPE E-9: ASTM C534, Type II, flexible, closed cell elastomeric insulation, sheet.
1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 25 degrees C).
  2. Operating Temperature Range: Range: Minus 70 to 220 degrees F (minus 57 to 105 degrees C).
  3. Vapor Barrier Jacket: VentureClad 1577CW-E, 6 mil, 0 permability, embossed natural aluminum finish
  4. Jacket Temperature Limit: minus 30 to 300 degrees F

## 2.6 EQUIPMENT INSULATION JACKETS

- A. PVC Plastic Equipment Jacket:
1. Product Description: ASTM D1784, sheet material, off-white color.
  2. Minimum Service Temperature: -40 degrees F (-40 degrees C).
  3. Maximum Service Temperature: 150 degrees F (66 degrees C).
  4. Moisture Vapor Transmission: ASTM E96; 0.002 perm-inches.
  5. Thickness: 10 mil (0.25 mm).
  6. Connections: Brush on welding adhesive Pressure sensitive color matching vinyl tape.
- B. Aluminum Equipment Jacket:
1. ASTM B209.
  2. Thickness: 0.016 inch (0.40 mm) thick sheet.
  3. Finish: Smooth.
  4. Joining: Longitudinal slip joints and 2-inch (50 mm) laps.
  5. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
  6. Metal Jacket Bands: 3/8 inch (10 mm) wide.
- C. Stainless Steel Equipment Jacket:
1. ASTM A167 Type 302 304 stainless steel.
  2. Thickness: 0.010 inch (0.25 mm) thick.
  3. Finish: Smooth.
  4. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.010 inch (0.25 mm) thick stainless steel.
- D. Canvas Equipment Jacket: UL listed, 6 oz/sq yd (220 g/sq m), plain weave cotton fabric with fire retardant lagging adhesive compatible with insulation.
- E. Vapor Retarder Jacket:
1. ASTM C921, white Kraft paper with glass fiber yarn, bonded to aluminized film.
  2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- F. Field Applied Glass Fiber Fabric Jacket System:
1. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
  2. Glass Fiber Fabric:
    - a. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
    - b. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.
    - c. Weave: 5 x 5.
  3. Indoor Vapor Retarder Finish:
    - a. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
    - b. Vinyl emulsion type acrylic, compatible with insulation, black color.

## 2.7 EQUIPMENT INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Tie Wire: 0.048-inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.

D. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.

E. Adhesives: Compatible with insulation.

## 2.8 DUCTWORK INSULATION

A. TYPE D-1: ASTM C1290, Type III, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.

1. Thermal Conductivity: 0.30 at 75 degrees F (0.043 at 24 degrees C).
2. Maximum Operating Temperature: 250 degrees F (121 degrees C).
3. Density: 0.75 pound per cubic foot (12 kilograms per cubic meter).

B. TYPE D-2: ASTM C612, Type IA or IB, rigid glass fiber, with factory applied all service facing meeting ASTM C1136, Type II.

1. Thermal Conductivity: 0.24 at 75 degrees F (at 24 degrees C).
2. Density: 1.6 pound per cubic foot (26 kilograms per cubic meter).

C. TYPE D-3: ASTM C612, Type IA or IB, rigid glass fiber, no facing.

1. Thermal Conductivity: 0.24 at 75 degrees F (0.035 at 24 degrees C).
2. Density: 1.6 pound per cubic foot (26 kilograms per cubic meter).

D. TYPE D-4: ASTM C1071, Type I, flexible, glass fiber duct liner with coated air side.

1. Thermal Conductivity: 0.28 at 75 degrees F (0.040 at 24 degrees C).
2. Density: 1.5 pound per cubic foot (24 kilograms per cubic meter).
3. Maximum Operating Temperature: 250 degrees F (121 degrees C).
4. Maximum Air Velocity: 6,000 feet per minute (30.5 meter per second).

E. TYPE D-5: ASTM C1071, Type II, rigid, glass fiber duct liner with coated air side.

1. Thermal Conductivity: 0.23 at 75 degrees F (0.033 at 24 degrees C).
2. Density: 3.0 pound per cubic foot (48 kilograms per cubic meter).
3. Maximum Operating Temperature: 250 degrees F (121 degrees C).
4. Maximum Air Velocity: 4,000 feet per minute (20.3 meter per second).

F. TYPE D-6: ASTM C534, Type II, flexible, closed cell elastomeric insulation, sheet.

1. Thermal Conductivity: 0.27 at 75 degrees F (0.039 at 24 degrees C).
2. Service Temperature Range: Range: Minus 58 to 180 degrees F (minus 50 to 82 degrees C).

G. TYPE D-7: ASTM C518, Owens Corning "Thermapink" Extruded Polystyrene insulation

1. Thermal Conductivity: 0.20 at 75 degrees F (0.039 at 24 degrees C).
2. Service Temperature Range: Range: -10 to 150 degrees F
3. Vapor Barrier Jacket: VentureClad 1577CW-E, 6 mil, 0 permability, embossed natural aluminum finish
4. Jacket Temperature Limit: minus 30 to 300 degrees F

H. TYPE D-8: Inorganic blanket encapsulated with scrim reinforced foil meeting UL 1978.

1. Thermal Conductivity: 0.42 at 500 degrees F
2. Weight: 130 pounds per 1000 square foot per inch
3. Flame spread rating of 0 and smoke developed rating of 0 in accordance with ASTM E84.

- I. TYPE D-9: ASTM C1290, Type III, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.
  - 1. Thermal Conductivity: 0.30 at 75 degrees F (0.043 at 24 degrees C).
  - 2. Maximum Operating Temperature: 250 degrees F (121 degrees C).
  - 3. Density: 0.75 pound per cubic foot (12 kilograms per cubic meter).
  - 4. Canvas Jacket: UL listed, 6 oz/sq yd (220 g/sq m), plain weave cotton fabric treated with fire retardant lagging adhesive.
- J. Acoustical Liner. Refer to drawings.

## 2.9 DUCTWORK INSULATION JACKETS

- A. Aluminum Duct Jacket:
  - 1. ASTM B209.
  - 2. Thickness: 0.016 inch (0.40 mm) thick sheet.
  - 3. Finish: Smooth.
  - 4. Joining: Longitudinal slip joints and 2-inch (50 mm) laps.
  - 5. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
  - 6. Metal Jacket Bands: 3/8 inch (10 mm) wide.
- B. Vapor Retarder Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film 0.0032-inch (0.081 mm) vinyl.
  - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
  - 3. Secure with pressure sensitive tape.
- C. Canvas Duct Jacket: UL listed, 6 oz/sq yd (220 g/sq m), plain weave cotton fabric with fire retardant lagging adhesive compatible with insulation.
- D. Outdoor Duct Jacket: VentureClad self adhesive aluminum jacketing system.
- E. Membrane Duct Jacket: ASTM D4637; Type I, EPDM; non-reinforced, 0.045 inch (mm) thick, 48 inch (1220 mm) wide roll; white color.

## 2.10 DUCTWORK INSULATION ACCESSORIES

- A. Vapor Retarder Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-based adhesive.
- B. Vapor Retarder Lap Adhesive: Compatible with insulation.
- C. Adhesive: Waterproof, ASTM E162 fire-retardant type.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.
- E. Tie Wire: 0.048-inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.
- F. Lagging Adhesive: Fire resistive to ASTM E84 NFPA 255 UL 723.

- G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.
- H. Adhesives: Compatible with insulation.
- I. Membrane Adhesives: As recommended by membrane manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify piping, equipment and ductwork has been tested before applying insulation materials.
- C. Verify surfaces are clean and dry, with foreign material removed.

### 3.2 INSTALLATION - PIPING SYSTEMS

- A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
- B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Refer to Section 07 84 00 for penetrations of assemblies with fire resistance rating greater than one hour.
- C. Piping Systems Conveying Fluids Below Ambient Temperature:
  - 1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
  - 2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
  - 3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.
- D. Glass Fiber Board Insulation:
  - 1. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
  - 2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
  - 3. Cover wire mesh or bands with cement to a thickness to remove surface irregularities.
- E. Polyisocyanurate Foam Insulation Extruded Polystyrene Insulation:
  - 1. Wrap elbows and fitting with vapor retarder tape.
  - 2. Seal butt joints with vapor retarder tape.
- F. Hot Piping Systems less than 140 degrees F (60 degrees C):

1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
  2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
  3. Do not insulate unions and flanges at equipment, but bevel and seal ends of insulation at such locations.
- G. Hot Piping Systems greater than 140 degrees F (60 degrees C):
1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
  2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
  3. Insulate flanges and unions at equipment.
- H. Inserts and Shields:
1. Piping 1-1/2 inches (40 mm) Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
  2. Piping 2 inches (50 mm) Diameter and Larger: Install insert between support shield and piping and under finish jacket.
    - a. Insert Configuration: Minimum 6 inches (150 mm) long, of thickness and contour matching adjoining insulation; may be factory fabricated.
    - b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
  3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.
- I. Insulation Terminating Points:
1. Coil Branch Piping 1 inch (25 mm) and Smaller: Terminate hot water piping at union upstream of the coil control valve.
  2. Chilled Water Coil Branch Piping: Insulate chilled water piping and associated components up to coil connection.
  3. Condensate Piping: Insulate entire piping system and components to prevent condensation.
- J. Closed Cell Elastomeric Insulation:
1. Push insulation on to piping.
  2. Miter joints at elbows.
  3. Seal seams and butt joints with manufacturer's recommended adhesive.
  4. When application requires multiple layers, apply with joints staggered.
  5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.
- K. High Temperature Pipe Insulation:
1. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- L. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with PVC jacket and fitting covers.
- M. Piping Exterior to Building: Provide vapor retarder jacket (Ventureclad). Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and

finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

- N. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.
- O. Heat Traced Piping Interior to Building: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer.
- P. Heat Traced Piping Exterior to Building: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size insulation large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water.

### 3.3 INSTALLATION - EQUIPMENT

- A. Factory Insulated Equipment: Do not insulate.
- B. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- C. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
- D. Equipment Containing Fluids Below Ambient Temperature:
  - 1. Insulate entire equipment surfaces.
  - 2. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
  - 3. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
  - 4. Finish insulation at supports, protrusions, and interruptions.
- E. Equipment Containing Fluids 140 degrees F (60 degrees C) Or Less:
  - 1. Do not insulate flanges and unions, but bevel and seal ends of insulation.
  - 2. Install insulation with factory-applied or field applied jackets, with or without vapor barrier. Finish with glass cloth and adhesive.
  - 3. Finish insulation at supports, protrusions, and interruptions.
- F. Equipment Containing Fluids Over 140 degrees F (60 degrees C):
  - 1. Insulate flanges and unions with removable sections and jackets.
  - 2. Install insulation with factory-applied or field applied jackets, with or without vapor barrier. Finish with glass cloth and adhesive.
  - 3. Finish insulation at supports, protrusions, and interruptions.
- G. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.

- H. Equipment Located Exterior to Building: Install vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal equipment.
- I. Cover glass fiber cellular glass hydrous calcium silicate cellular foam insulation with aluminum jacket.
- J. Nameplates and ASME Stamps: Bevel and seal insulation around; do not cover with insulation.
- K. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation for easy removal and replacement without damage.
- L. Prepare equipment insulation for finish painting. Refer to Section 09 90 00.

### 3.4 INSTALLATION - DUCTWORK SYSTEMS

- A. Duct dimensions indicated on Drawings are finished inside dimensions.
- B. Insulated ductwork conveying air below ambient temperature:
  1. Provide insulation with vapor retarder jackets.
  2. Finish with tape and vapor retarder jacket.
  3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
  1. Provide with or without standard vapor retarder jacket.
  2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Ductwork Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet (3 meters) above finished floor): Finish with aluminum jacket.
- E. External Glass Fiber Duct Insulation:
  1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
  2. Secure insulation without vapor retarder with staples, tape, or wires.
  3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
  4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
  5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- F. External Elastomeric Duct Insulation:
  1. Adhere to clean oil-free surfaces with full coverage of adhesive.
  2. Seal seams and butt joints with manufacturer's recommended adhesive.
  3. When application requires multiple layers, apply with joints staggered.
  4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
  5. Lift ductwork off trapeze hangers and insert spacers.



- G. Duct Liner:
1. Adhere insulation with adhesive for 100 percent coverage.
  2. Secure insulation with mechanical liner fasteners. Comply with SMACNA Standards for spacing.
  3. Seal and smooth joints. Seal and coat transverse joints.
  4. Seal liner surface penetrations with adhesive.
  5. Cut insulation for tight overlapped corner joints. Support top pieces of liner at edges with side pieces.
- H. Kitchen Exhaust Ductwork:
1. Cover duct by wrapping with insulation using butt joint with collar method.
  2. Overlap seams of each method by 3 inches (76 mm).
  3. Attach insulation using steel banding or by welded pins and clips.
  4. Install insulation without sag on underside of ductwork. Use additional fasteners to prevent sagging.
- I. Ducts Exterior to Building:
1. Install insulation according to external duct insulation paragraph above.
  2. Provide external insulation with vapor retarder jacket. Cover with with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
  3. Finish with mineral fiber outdoor duct jacket or aluminum duct jacket or membrane duct jacket.
  4. Calk seams at flanges and joints. Located major longitudinal seams on bottom side of horizontal duct sections.
- J. Prepare duct insulation for finish painting. Refer to Section 09 90 00.

3.5 SCHEDULES

A. Ductwork Insulation Schedule:

SYSTEM	INSULATION TYPE	INSULATION THICKNESS inches (mm)
Indoor Supply Ducts (externally insulated) (R-6)	D-1	2.0 (50)
Indoor Return Ducts (externally insulated) (R-6)	D-1	2.0 (50)
Indoor exhaust duct	none	none
Supply Air, Return Air duct exterior to building (R-8)	D-6 (w/ VentureClad Jacket)	3.0 (75)
Indoor Return ducts where liner is called out specifically by drawings (R-6)	D-5	1.5 (38)
Roof Curbs (packaged units) (R-8)	D-5	2.0 (50)

Refer to schedule on drawings for specific applications as some ductwork does not require insulation (exposed to conditioned space), and some ductwork shall require special acoustic liner.

END OF SECTION

**SECTION 23 08 00**  
**COMMISSIONING OF HVAC**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. HVAC commissioning description.
  - 2. HVAC commissioning responsibilities.

**1.2 REFERENCES**

- A. Associated Air Balance Council:
  - 1. AABC - AABC Commissioning Guideline.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
  - 1. ASHRAE Guideline 1 - The HVAC Commissioning Process.
- C. National Environmental Balancing Bureau:
  - 1. NEBB - Procedural Standards for Building Systems Commissioning.

**1.3 COMMISSIONING DESCRIPTION**

- A. HVAC commissioning process includes the following tasks:
  - 1. Testing and startup of HVAC equipment and systems.
  - 2. Equipment and system verification checks.
  - 3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
  - 4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.
  - 5. Complete and endorse functional performance test checklists to assure equipment and systems are fully operational and ready for functional performance testing.
  - 6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
  - 7. Provide operation and maintenance information and record drawings to the Architect for review verification and organization, prior to distribution.
  - 8. Provide assistance to Engineer to develop, edit, and document system operation descriptions.
  - 9. Provide training for systems specified in this Section.
- B. Equipment and Systems to Be Commissioned:
  - 1. Chillers.
  - 2. Pumps.

3. Piping systems.
4. Ductwork.
5. Variable frequency drives.
6. Air handling units.
7. Hot water terminal heating equipment.
8. Variable volume terminal units.
9. Automatic temperature control system.
10. Testing, Adjusting and Balancing work.

#### 1.4 COMMISSIONING SUBMITTALS

- A. Section 01 91 00 - Commissioning: Requirements for commissioning submittals.
- B. Draft Forms: Submit draft of system verification form and functional performance test checklist.
- C. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use AABC forms as guidelines.
- D. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.
- C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

#### 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AABC.

#### 1.7 COMMISSIONING RESPONSIBILITIES

- A. Equipment or System Installer Commissioning Responsibilities:
  1. Provide instructions and demonstrations for Owner's personnel.
  2. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.

3. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.
  4. Perform and document completed startup and system operational checkout procedures, providing copy to Engineer.
  5. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
  6. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
- B. Temperature Controls Installer Commissioning Responsibilities:
1. Review design for ability of systems to be controlled including the following:
    - a. Confirm proper hardware requirements exists to perform functional performance testing.
    - b. Confirm proper safeties and interlocks are included in design.
    - c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.
    - d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.
    - e. Confirm sensors selected are within device ranges.
    - f. Review sequences of operation and obtain clarification from Architect/Engineer.
    - g. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.
  2. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.
  3. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Architect/Engineer.
  4. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.
  5. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan.
  6. Demonstrate system performance and operation to Engineer during functional performance tests including each mode of operation.
  7. Provide control system technician to assist during Engineering verification check and functional performance testing.
  8. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.

9. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.
- C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:
1. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes.
  2. Assist in performing operation and maintenance training sessions.

## 1.8 SCHEDULING

- A. 01 32 16 - Construction Progress Schedule: Requirements for scheduling.
- B. Prepare schedule indicating anticipated start dates for the following:
1. Piping system pressure testing.
  2. Piping system flushing and cleaning.
  3. Ductwork cleaning.
  4. Ductwork pressure testing.
  5. Equipment and system startups.
  6. Automatic temperature control system checkout.
  7. Testing, adjusting, and balancing.
  8. HVAC system orientation and inspections.
  9. Operation and maintenance manual submittals.
  10. Training sessions.

## 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Notify Architect minimum of two weeks in advance of the following:
1. Scheduled equipment and system startups.
  2. Scheduled automatic temperature control system checkout.
  3. Scheduled start of testing, adjusting, and balancing work.
- C. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required by construction documents.
- B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.
- C. Install replacement sheaves and belts to obtain system performance, as requested by Engineer.
- D. Install test holes in ductwork and plenums as requested by Engineer for taking air measurements.
- E. Prior to start of functional performance test, install replacement filters in equipment.

### 3.2 COMMISSIONING

- A. Functional Performance Tests:
  - 1. Test heating equipment at winter design temperatures. (This test may be done by “falsifying” BAS OAT, Space temp, etc.) Monitor system for proper operation.
  - 2. Test cooling equipment at summer design temperatures. (This test may be done by “falsifying” BAS OAT, Space temp, etc.) Monitor system for proper operation.

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END OF SECTION



## SECTION 23 33 00 AIR DUCT ACCESSORIES

### 1.1 GENERAL

#### A. Summary:

1. Section Includes:
  - a. Back-draft dampers.
  - b. Combination fire-and-smoke dampers.
  - c. Duct access doors.
  - d. Dynamic fire dampers.
  - e. Static fire dampers.
  - f. Ceiling fire dampers.
  - g. Smoke dampers.
  - h. Volume control dampers.
  - i. Flexible duct connections.
  - j. Duct test holes.
  - k. Dial thermometers.
  - l. Static pressure gages.

#### B. References:

1. Air Movement and Control Association International, Inc.:
  - a. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
2. ASTM International:
  - a. ASTM E1 - Standard Specification for ASTM Thermometers.
3. National Fire Protection Association:
  - a. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
  - b. NFPA 92A - Recommended Practice for Smoke-Control Systems.
4. Sheet Metal and Air Conditioning Contractors:
  - a. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
5. Underwriters Laboratories Inc.:
  - a. UL 555 - Standard for Safety for Fire Dampers.
  - b. UL 555C - Standard for Safety for Ceiling Dampers.
  - c. UL 555S - Standard for Safety for Smoke Dampers.

#### C. Submittals:

1. Section 01 33 00 - Submittal Procedures: Submittal procedures.
2. Product Data: Submit data for shop fabricated assemblies and hardware used.
3. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
  - a. Fire dampers including locations and ratings.
  - b. Smoke dampers including locations and ratings.

- c. Backdraft dampers.
  - d. Flexible duct connections.
  - e. Volume control dampers.
  - f. Duct access doors.
  - g. Duct test holes.
4. Product Data: For fire dampers smoke dampers combination fire and smoke dampers submit the following:
    - a. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
    - b. Indicate materials, construction, dimensions, and installation details.
    - c. Damper pressure drops ratings based on tests and procedures performed in accordance with AMCA 500.
  5. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.
  6. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- D. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
  2. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.
- E. Quality Assurance:
1. Dampers tested, rated, and labeled in accordance with the latest UL requirements.
  2. Damper pressure drops ratings based on tests and procedures performed in accordance with AMCA 500.
  3. Maintain one copy of each document on site.
- F. Qualifications:
1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- G. Delivery, Storage, and Handling:
1. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
  2. Protect dampers from damage to operating linkages and blades.
  3. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
  4. Storage: Store materials in a dry area indoor, protected from damage.
  5. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

- H. Field Measurements: Verify field measurements prior to fabrication.
- I. Coordination:
  - 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
  - 2. Coordinate Work where appropriate with building control Work.
- J. Warranty:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
  - 2. Furnish one-year manufacturer warranty for duct accessories.

## 1.2. PRODUCTS

- A. Back-Draft Dampers:
  - 1. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gage thick steel. Blades, maximum 6-inch width, center pivoted, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.
- B. Static Fire Dampers: Product description. Multi Blade steel shutter gravity actuated, fusible link held, rated assembly.

## 1.3. EXECUTION

- A. Examination:
  - 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
  - 2. Verify rated walls are ready for fire damper installation.
  - 3. Verify ducts and equipment installation are ready for accessories.
  - 4. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.
- B. Installation:
  - 1. Install in accordance with NFPA 90A and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
  - 2. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside.
  - 3. Access Door Sizes: Install minimum 8 x 8-inch size for hand access, 18 x 18-inch size for shoulder access, and. Review locations prior to fabrication.
    - a. Mark access doors for fire and smoke dampers on outside surface, with minimum 1/2-inch-high letters reading:

FIRE/SMOKE DAMPER, SMOKE DAMPER, OR FIRE DAMPER.

4. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

END 23 33 00.

## SECTION 23 36 00

### AIR TERMINALS

#### A. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### B. SUMMARY

1. This Section includes the following:
  - a. Single-duct air terminals.

#### C. SUBMITTALS

1. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated. Include a schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished.
2. Maintenance Data: List of parts for each type of air terminal and troubleshooting maintenance guide to include in the maintenance manuals specified in Division 1.

#### D. QUALITY ASSURANCE

1. Product Options: Drawings and schedules indicate requirements of air terminals and are based on specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
2. Listing and Labeling: Provide electrically operated air terminals specified in this Section that are listed and labeled.
  - a. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
3. NFPA Compliance: Install air terminals according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
4. Comply with NFPA 70 for electrical components and installation.

### PART 2 - PRODUCTS

#### A. MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide air terminals by one of the following:

- a. Acutherm.
- b. Air System Components; Krueger Div.
- c. Anemostat Products Div.
- d. Carnes Co., Inc.
- e. Carrier Corp.
- f. Environmental Technologies.
- g. Nailor Industries Inc.
- h. Phoenix Controls Corp.
- i. Titus.
- j. Trane Co. (The).
- k. Trox USA, Inc.
- l. Tuttle & Bailey, Hart & Cooley, Inc.
- m. Warren Technologies.
- n. York International Corp.

## B. SINGLE-DUCT AIR TERMINALS

1. Configuration: Volume-damper assembly inside unit casing. Locate control components inside protective metal shroud.
2. Casings: Steel or aluminum sheet metal of the following minimum thicknesses:
  - a. Upstream Pressure Side: 0.0239-inch (0.6-mm) steel.
  - b. Downstream Pressure Side: 0.0179-inch (0.45-mm) steel.
  - c. Upstream Pressure Side: 0.032-inch (0.8-mm) aluminum.
  - d. Downstream Pressure Side: 0.025-inch (0.63-mm) aluminum.
3. Casing Lining: Minimum of 1/2-inch- (13-mm-) thick, neoprene- or vinyl-coated, fibrous-glass insulation; 1.5-lb/cu. ft. (24-kg/cu. m) density, complying with NFPA 90A requirements and UL 181 erosion requirements. Secure lining to prevent delamination, sagging, or settling.
  - a. Coat liner surfaces and edges with erosion-resistant coating or cover with perforated metal; or other approved material.
4. Plenum Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
5. Plenum Air Outlets: S-slip and drive connections.
6. Access: Removable panels to permit access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
7. Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings.
  - a. Maximum Damper Leakage: 2 percent of nominal airflow at 1-inch wg (250-Pa) inlet static pressure.
  - b. Damper Position: Normally closed.

8. Attenuator Section: Line with 2-inch- (50-mm-) thick, neoprene- or vinyl-coated, fibrous-glass insulation.
9. Hot-Water Heating Coil: 1/2-inch (13-mm) copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig (1380 kPa); and factory installed.
10. Controls: Damper operator, thermostat, and other devices compatible with temperature controls specified in other Division 15 Sections.
11. Electric Controls: 24-V damper actuator with wall-mounted electric thermostat and appropriate mounting hardware.
12. Electronic Controls: Bidirectional damper operator and microprocessor-based controller with integral airflow transducer and room sensor provide control with the following features:
  - a. Proportional plus integral control of room temperature.
  - b. Time-proportional reheat-coil control.
  - c. Occupied/unoccupied operating mode.
  - d. Remote reset of airflow or temperature set points.
  - e. Adjusting and monitoring with portable terminal.
  - f. Communication with temperature-control system specified in other Division 15 Sections.

#### C. SOURCE QUALITY CONTROL

1. Testing Requirements: Test and rate air terminals according to ARI 880, "Industry Standard for Air Terminals."
2. Identification: Label each air terminal with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

### PART 3 - EXECUTION

#### A. INSTALLATION

1. Install air terminals level and plumb, according to manufacturer's written instructions, rough-in drawings, original design, and referenced standards; and maintain sufficient clearance for normal service and maintenance.
2. Connect ductwork to air terminals according to Division 15 ductwork Sections.

#### B. CONNECTIONS

1. Install piping adjacent to air terminals to allow service and maintenance.

2. Hot-Water Piping: In addition to requirements in Division 15 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
3. Electrical: Comply with applicable requirements in Division 16 Sections.
4. Ground equipment.
  - a. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

C. FIELD QUALITY CONTROL

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. CLEANING

1. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

E. COMMISSIONING

1. Verify that installation of each air terminal is according to the Contract Documents.
2. Check that inlet duct connections are as recommended by air terminal manufacturer to achieve proper performance.
3. Check that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Check that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

F. DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
  - a. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
  - b. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."



- c. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
- d. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

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END OF SECTION 233600

## SECTION 23 89 00 METAL DUCTS

### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary: This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg.
- C. Definitions:
  - 1. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula  $\text{Btu} \times \text{in./h} \times \text{sq. ft.} \times \text{deg F}$  or  $\text{W/m} \times \text{K}$  at the temperature differences specified. Values are expressed as Btu or W.
    - a. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.
- D. System Description: Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.
- E. Submittals:
  - 1. Product Data: For duct liner and sealing materials.
  - 2. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
  - 3. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.
- F. Quality Assurance:
  - 1. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
  - 2. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.
- G. Delivery, Storage, and Handling:
  - 1. Deliver sealant materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
  - 2. Store and handle sealant materials according to manufacturer's written recommendations.

### 1.2 PRODUCTS

- A. Sheet Metal Materials:
1. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
  2. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
  3. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).
  4. Aluminum Sheets: ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14, sheet form with standard, one-side bright finish for ducts exposed to view and with mill finish for concealed ducts.
  5. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, exposed matte finish.
  6. Stainless Steel: ASTM A 480/A 480M, Type 316, sheet form with No. 4 finish for surfaces of ducts exposed to view; and Type 304, sheet form with No. 1 finish for concealed ducts.
- B. Duct Liner: allowed only where specifically called for by the drawings.
- C. Sealant Materials:
1. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
    - a. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
    - b. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
    - c. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
    - d. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- D. Hangers and Supports:
1. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.
    - a. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
    - b. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
  2. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
    - a. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.

- b. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
  - 3. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
  - 4. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
    - a. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
    - b. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
    - c. Supports for Aluminum Ducts: Aluminum support materials, unless materials are electrolytically separated from ductwork.
- E. Rectangular Duct Fabrication:
  - 1. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
    - a. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
    - b. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
  - 2. Fabricate range hood exhaust ducts with 0.0598-inch- (1.5-mm-) thick, carbon-steel sheet for concealed ducts and 0.0500-inch- (1.3-mm-) thick stainless steel for exposed ducts. Weld and flange seams and joints. Comply with NFPA 96.
  - 3. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
    - a. Supply Ducts: 3-inch wg.
    - b. Return Ducts: 2-inch wg, negative pressure.
    - c. Exhaust Ducts: 2-inch wg, negative pressure.
  - 4. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.
- F. Round and Flat-Oval Supply and Exhaust Fitting Fabrication:
  - 1. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.
  - 2. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

### 1.3. EXECUTION

- A. Duct Installation, General:
  - 1. Drawings indicate general arrangement of ducts, fittings, and accessories.
  - 2. Construct and install each duct system for the specific duct pressure classification indicated.

3. Install round and flat-oval ducts in lengths not less than eight feet, unless interrupted by fittings.
  4. Install ducts with fewest possible joints.
  5. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
  6. Install couplings tight to duct wall surface with a minimum of projections into duct.
  7. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
  8. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
  9. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
  10. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
  11. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- B. Ductwork Material Application:
1. Unless noted otherwise, galvanized ductwork shall be used. Refer to the drawings for rectangular, spiral round or other types.
  2. Exhaust ductwork in locker room areas (concealed and exposed) shall be fabricated from aluminum materials, in accordance with current Smacna standards. Refer to the drawings for rectangular, spiral round or other types.
- C. Seam and Joint Sealing:
1. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and as compliant with IECC 2018 code requirements.
- D. Hanging and Supporting:
1. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
  2. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
  3. Support vertical ducts at a maximum interval of 16 feet and at each floor.
  4. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
  5. Install concrete inserts before placing concrete.
  6. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
- E. Connections:
1. Connect equipment with flexible connectors.
  2. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- F. Field Quality Control:
1. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.

2. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round and flat-oval ducts, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.
  3. Remake leaking joints and retest until leakage is less than maximum allowable.
  4. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."
- G. Adjusting:
1. Adjust volume-control dampers in ducts, outlets, and inlets to achieve design airflow.
  2. Refer to Section "Testing, Adjusting, and Balancing" for detailed procedures.
- H. Cleaning: After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

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## SECTION 23 93 00

### DIFFUSERS, REGISTERS, AND GRILLES

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary: This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.
- C. Definitions:
  - 1. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
  - 2. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
  - 3. Register: A combination grille and damper assembly over an air opening.
- D. Submittals:
  - 1. Product Data: For each model indicated, include the following:
    - a. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
    - b. Performance Data: Include throw and drop, static pressure drop, and noise ratings for each type of air outlet and inlet.
- E. Quality Assurance:
  - 1. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
  - 2. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

#### 1.2 PRODUCTS

- A. Manufacturers:
  - a. Titus,
  - b. Krueger,
  - c. Price,
  - d. Carnes.
- B. Manufactured Units: Diffusers, registers, and grilles are scheduled on Drawings.
- C. Source Quality Control:

1. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

### 1.3. EXECUTION

- A. Examination: Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Installation:
  1. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
  2. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- C. Adjusting: After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.
- D. Cleaning: After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

## SECTION 26 05 00

### COMMON WORK RESULTS FOR ELECTRICAL

#### 1.1 GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary: This Section includes the following:
  - 1. Supporting devices for electrical components.
  - 2. Electrical identification.
  - 3. Electricity-metering components.
  - 4. Concrete equipment bases.
  - 5. Electrical demolition.
  - 6. Cutting and patching for electrical construction.
  - 7. Touchup painting.
- C. Definitions:
  - 1. EMT: Electrical metallic tubing.
  - 2. FMC: Flexible metal conduit.
  - 3. IMC: Intermediate metal conduit.
  - 4. LFMC: Liquid tight flexible metal conduit.
  - 5. RNC: Rigid nonmetallic conduit.
  - 6. RGSC: Rigid, heavy wall, galvanized steel conduct.
- D. Submittals:
  - 1. Product Data: For electricity-metering equipment.
  - 2. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.
  - 3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- E. Quality Assurance:
  - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 2. Comply with NFPA 70.
- F. Coordination:
  - 1. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
    - a. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
  - 2. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
  - 3. Coordinate electrical service connections to components furnished by utility companies.

- a. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
  - b. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- 4. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."
  - 5. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
  - 6. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

## 1.2. PRODUCTS

### A. Supporting Devices:

- 1. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- 2. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- 3. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- (14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.
- 4. Slotted-Steel Channel Supports: Comply with Division 5 Section "Metal Fabrications" for slotted channel framing.
  - a. Channel Thickness: Selected to suit structural loading.
  - b. Fittings and Accessories: Products of the same manufacturer as channel supports.
- 5. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass-fiber-resin channels, and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (203 mm) o.c., in at least one surface.
  - a. Fittings and Accessories: Products of the same manufacturer as channels and angles.
  - b. Fittings and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
- 6. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- 7. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- 8. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- 9. Expansion Anchors: Carbon-steel wedge or sleeve type.
- 10. Toggle Bolts: All-steel springhead type.
- 11. Powder-Driven Threaded Studs: Heat-treated steel.

### B. Electrical Identification:

1. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
  2. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
    - a. Type: Pretensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
    - b. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
    - c. Color: Black letters on orange background.
    - d. Legend: Indicates voltage.
  3. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).
  4. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
    - a. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
    - b. Compounded for permanent direct-burial service.
    - c. Embedded continuous metallic strip or core.
    - d. Printed legend that indicates type of underground line.
  5. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
  6. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
  7. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.
  8. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
  9. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6-mm) grommets in corners for mounting.
  10. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws, or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- C. Equipment for Utility Company's Electricity Metering:
1. not used
- D. Equipment for Electricity Metering by Owner: Not used.
- E. Concrete Bases:
1. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."
  2. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

- F. Touch-up Paint:
  - 1. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
  - 2. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

### 1.3. EXECUTION

- A. Electrical Equipment Installation:
  - 1. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide the maximum possible headroom.
  - 2. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
  - 3. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
  - 4. Right of Way: Give to raceways and piping systems installed at a required slope.
- B. Electrical Supporting Device Application:
  - 1. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
  - 2. Dry Locations: Steel materials.
  - 3. Support Clamps for PVC Raceways: Click-type clamp system.
  - 4. Selection of Supports: Comply with manufacturer's written instructions.
  - 5. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.
- C. Support Installation:
  - 1. Install support devices to fasten and support electrical components securely and permanently.
  - 2. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
  - 3. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
  - 4. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
  - 5. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
  - 6. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.
  - 7. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
  - 8. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
  - 9. Simultaneously install vertical conductor supports with conductors.
  - 10. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

11. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
12. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
13. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
  - a. Wood: Fasten with wood screws or screw-type nails.
  - b. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
  - c. New Concrete: Concrete inserts with machine screws and bolts.
  - d. Existing Concrete: Expansion bolts.
  - e. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
  - f. Steel: Welded threaded studs or spring-tension clamps on steel.
    - 1) Field Welding: Comply with AWS D1.1.
  - g. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
  - h. Light Steel: Sheet-metal screws.
  - i. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

D. Identification Materials and Devices:

1. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
2. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
3. Self-Adhesive Identification Products: Clean surfaces before applying.
4. Identify raceways and cables with color banding as follows:
  - a. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
  - b. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.
  - c. Colors: As follows:
    - 1) Fire Alarm System: Red
    - 2) Security System: Blue and yellow.
    - 3) Telecommunication System: Green and yellow.
5. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
6. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench

- or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.
7. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
    - a. Phase A: Black
    - b. Phase B: Red
    - c. Phase C: Blue
    - d. Neutral: White
    - e. Ground: Green
  8. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
    - a. Phase A: Yellow
    - b. Phase B: Brown
    - c. Phase C: Orange
    - d. Neutral: Grey
    - e. Ground: Green with white trace.
  9. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
  10. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
- E. Utility Company Electricity-Metering Equipment: refer to drawings
- F. Firestopping: Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."
- G. Concrete Bases: Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."
- H. Cutting and Patching:
  1. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
  2. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.
- I. Field Quality Control: Inspect installed components for damage and faulty work, including the following:
  1. Raceways
  2. Building wire and connectors.
  3. Supporting devices for electrical components.
  4. Electrical identification.



5. Electricity-metering components.
  6. Concrete bases.
  7. Electrical demolition.
  8. Cutting and patching for electrical construction.
  9. Touchup painting.
- J. Refinishing and Touchup Painting: Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.
- K. Cleaning and Protection:
1. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
  2. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

**SECTION 26 05 18  
PENETRATION FIRESTOPPING FOR ELECTRICAL**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested firestop systems shall be used in specific locations as follows: Penetrations for the passage of cables, conduit, and other electrical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
  - 1. Section 03300 - Cast-In-Place Concrete
  - 2. Section 04200 - Masonry Work
  - 3. Section 07840 – Firestopping
  - 4. Section 09250 - Gypsum Drywall Systems
  - 5. Section 13080 - Sound, Vibration and Seismic Control
  - 6. Section 13900 - Fire Suppression and Supervisory Systems
  - 7. Section 16050 - Basic Electrical Materials and Methods
  - 8. Section 15300 - Fire Protection

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
  - 1. UL Fire Resistance Directory:
    - a. Firestop Devices (XHJI)
    - b. Fire Resistance Ratings (BXRH)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)
    - e. Forming Materials (XHKU)

- D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- E. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials."
- G. All major building codes: ICBO, SBCCI, BOCA, and IBC.
- H. NFPA 101 - Life Safety Code
- I. NFPA 70 - National Electric Code

#### 1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

#### 1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

#### 1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install

manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

- B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
- C. The work is to be installed by a contractor with at least one of the following qualifications:
  - FM 4991 Approved Contractor
  - UL Approved Contractor
  - Hilti Accredited Fire Stop Specialty Contractor
- D. Firm with not less than 3 years experience with fire stop installation.
- E. Successfully completed not less than 3 comparable scale projects using similar systems.

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature limitations.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Scheduling
  - 1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
  - 2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## **PART 2 - PRODUCTS**

### **2.01 FIRESTOPPING, GENERAL**

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
- D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 3. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
- E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

### **2.02 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers per section 26 00 01 electrical approved manufacturers.

### **2.03 MATERIALS**

- A. Use only firestop products that have been UL 1479 or ASTM E 814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

- B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, refer to referenced products.
  - 1. Hilti Cast-In Place Firestop Device (CP 680-P) for use with combustible penetrants.
  - 2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
  - 3. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.
  - 4. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
  
- C. Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), refer to referenced products.
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - 2. Hilti Fire Foam (CP 620)
  - 3. Hilti Flexible Firestop Sealant (CP 606)
  
- D. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles, and plastic pipe, refer to referenced products.
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  
- E. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, refer to referenced products.
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - 2. Hilti Fire Foam (CP 620)
  - 3. Hilti Flexible Firestop Sealant (CP 606)
  
- F. Non curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, refer to referenced products.
  - 1. Hilti Firestop Putty Stick (CP 618)
  - 2. Hilti Firestop Plug (CFS-PL)
  
- G. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, refer to referenced products.
  - 1. Hilti Firestop Putty Pad (CP 617)
  - 2. Hilti Firestop Box Insert
  
- H. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, refer to referenced products.
  - 1. Hilti Firestop Mortar (CP 637)
  - 2. Hilti Firestop Block (CFS-BL)
  - 3. Hilti Fire Foam (CP 620)
  - 4. Hilti Firestop Board (CP 675T)
  
- I. Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, refer to referenced products.

1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Board (CP 675T)
- J. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, refer to reference products.
1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Plug (CFS-PL)
- K. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E 814 which is equal to the time rating of construction being penetrated.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
1. Verify penetrations are properly sized and in suitable condition for application of materials.
  2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  5. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 COORDINATION**

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

#### **3.03 INSTALLATION**

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.
1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
  2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
  3. Protect materials from damage on surfaces subjected to traffic.

### 3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

### 3.05 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration location on the entire project.
  - A.1 The Documentation Form for through penetrations is to include:
    - 1. A Sequential Location Number
    - 2. The Project Name
    - 3. Date of Installation
    - 4. Detailed description of the penetrations location
    - 5. Tested System or Engineered Judgment Number
    - 6. Type of assembly penetrated
    - 7. A detailed description of the size and type of penetrating item
    - 8. Size of opening
    - 9. Number of sides of assemblies addressed
    - 10. Hourly rating to be achieved
    - 11. Installers Name
  - B. Copies of these documents are to be provided to the general contractor at the completion of the project.
  - C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
    - 1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
    - 2. Contractor's Name, address, and phone number.
    - 3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
    - 4. Date of Installation.
    - 5. Through-Penetration firestop system manufacturer's name.
    - 6. Installer's Name.
  - D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every



firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:

1. Create multiple projects/ facilities, add/create/ remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.
2. Define data to track using pre-defined input fields or creating custom input fields as desired.
3. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.
4. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.
5. Annotate (mark) location of penetration on 2D floor plan.
6. Create reports by filtering data and utilizing report templates.
7. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application and cloud-based system.
8. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.

Permanently attach identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes.

Reference Software: Hilti CFS-DM, from Hilti Inc., Tulsa, OK. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: [www.us.hilti.com](http://www.us.hilti.com) or [www.hilti.ca.com](http://www.hilti.ca.com)

1. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

### 3.06 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

### 3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

- A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

**END OF SECTION**

## SECTION 26 05 19

### LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 GENERAL

##### A. SUMMARY

a. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

##### B. REFERENCES

1. International Electrical Testing Association:
  - a. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
2. National Fire Protection Association:
  - a. NFPA 70 - National Electrical Code.
  - b. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
3. Underwriters Laboratories, Inc.:
  - a. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

##### C. SYSTEM DESCRIPTION

1. Product Requirements: Provide products as follows:
  - a. Solid conductor for feeders and branch circuits 10 AWG and smaller.
  - b. Stranded conductors for control circuits.
  - c. Conductor not smaller than 12 AWG for power and lighting circuits.
  - d. Conductor not smaller than 14 AWG for control circuits.
  - e. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
2. Wiring Methods: Provide the following wiring methods:
  - a. Concealed Dry Interior Locations: Use only building wire in raceway.
  - b. Exposed Dry Interior Locations: Use only building wire in raceway.
  - c. Above Accessible Ceilings: Use only building wire in raceway.
  - d. Wet or Damp Interior Locations: Use only building wire in raceway.
  - e. Exterior Locations: Use only building wire in raceway.

##### D. DESIGN REQUIREMENTS

1. Conductor sizes are based on copper unless indicated as aluminum or "AL".
2. When aluminum conductor is substituted for copper conductor, size to match circuit requirements, terminations, conductor ampacity and voltage drop.

##### E. SUBMITTALS

1. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

2. Product Data: Submit for building wire and each cable assembly type.
3. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
4. Test Reports: Indicate procedures and values obtained.

F. CLOSEOUT SUBMITTALS

1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
2. Project Record Documents: Record actual locations of components and circuits.

G. QUALITY ASSURANCE

1. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
2. Perform Work in accordance with
3. Maintain one copy of each document on site.

H. QUALIFICATIONS

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

I. FIELD MEASUREMENTS

1. Verify field measurements are as indicated on Drawings.

J. COORDINATION

1. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
2. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
3. Wire and cable routing indicated is approximate unless dimensioned.

**PART 2 PRODUCTS**

A. BUILDING WIRE

1. Manufacturers:
  - a. Refer to section 26 00 01 for approved electrical manufacturers.
2. Product Description: Single conductor insulated wire.
3. Conductor: Copper.
4. Insulation Voltage Rating: 600 volts.

5. Insulation Temperature Rating: 75 degrees C.

6. Insulation Material: Thermoplastic.

**B. SERVICE ENTRANCE CABLE**

1. Manufacturers:

a. Refer to section 26 00 01 for approved electrical manufacturers.

2. Conductor: Copper.

3. Insulation Voltage Rating: 600 volts.

4. Insulation: Type.

**C. TERMINATIONS**

1. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

2. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

**PART 3 EXECUTION**

**A. EXAMINATION**

1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

2. Verify interior of building has been protected from weather.

3. Verify mechanical work likely to damage wire and cable has been completed.

4. Verify raceway installation is complete and supported.

**B. PREPARATION**

1. Completely and thoroughly swab raceway before installing wire.

**C. EXISTING WORK**

1. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.

2. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

3. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

4. Extend existing circuits using materials and methods as specified.

5. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

## D. INSTALLATION

1. Route wire and cable to meet Project conditions.
2. Neatly train and lace wiring inside boxes, equipment, and panelboards.
3. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
4. Special Techniques--Building Wire in Raceway:
  - a. Pull conductors into raceway at same time.
  - b. Install building wire 4 AWG and larger with pulling equipment.
5. Special Techniques - Cable:
  - a. Protect exposed cable from damage.
  - b. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
  - c. Use suitable cable fittings and connectors.
6. Special Techniques - Wiring Connections:
  - a. Clean conductor surfaces before installing lugs and connectors.
  - b. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
  - c. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
  - d. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
  - e. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
  - f. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
  - g. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
7. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
8. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.
9. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
10. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

## E. WIRE COLOR

1. General:
  - a. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
    - 1.) Black and red for single phase circuits at 120/240 volts.
    - 2.) Black, red, and blue for circuits at 120/208 volts single or three phase.

- 3.) Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
  - b. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
    - 1.) Black and red for single phase circuits at 120/240 volts.
    - 2.) Black, red, and blue for circuits at 120/208 volts single or three phase.
    - 3.) Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
2. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
3. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
4. Feeder Circuit Conductors: Uniquely color code each phase.
5. Ground Conductors:
  - a. For 6 AWG and smaller: Green.
  - b. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

F. FIELD QUALITY CONTROL

1. Section: Field inspecting, testing, adjusting, and balancing.
2. Inspect and test in accordance with NETA ATS, except Section 4.
3. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

## SECTION 26 05 26

### GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### 1.1 GENERAL

- A. Summary: This Section includes:
  - 1. Rod electrodes.
  - 2. Mechanical connectors.
  - 3. Exothermic connections.
  
- B. References:
  - 1. Institute of Electrical and Electronics Engineers:
    - a. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
    - b. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
  - 2. International Electrical Testing Association:
    - a. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
  - 3. National Fire Protection Association:
    - a. NFPA 70 - National Electrical Code.
    - b. NFPA 99 - Standard for Health Care Facilities.
  
- C. System Description:
  - 1. Grounding systems use the following elements as grounding electrodes:
    - a. Metal underground water pipe.
    - b. Concrete-encased electrode.
    - c. Rod electrode.
  
- D. Performance Requirements:
  - 1. Grounding System Resistance: 5 ohms maximum.
  
- E. Submittals:
  - 1. Product Data: Submit data on grounding electrodes and connections.
  - 2. Test Reports: Indicate overall resistance to ground.
  
- F. Closeout Submittals:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
  - 2. Project Record Documents: Record actual locations of components and grounding electrodes.
  
- G. Quality Assurance:
  - 1. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
  - 2. Perform Work in accordance with



- H. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
  - 2. Installer: Company specializing in performing work of this section with minimum years experience.
  
- I. Delivery, Storage, and Handling:
  - 1. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
  - 2. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
  - 3. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
  - 4. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.
  
- J. Coordination:
  - 1. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
  - 2. Complete grounding and bonding of building reinforcing steel prior concrete placement.

## 1.2. PRODUCTS

- A. Rod Electrodes:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Product Description:
    - a. Material: Copper-clad steel or Copper.
    - b. Diameter: 3/4 inch.
    - c. Length: 10 feet.
  - 3. Connector: Connector for exothermic welded connection. or U-bolt clamp.
  
- B. Wire:
  - 1. Material: Stranded copper.
  - 2. Foundation Electrodes: 4 AWG.
  - 3. Grounding Electrode Conductor: Copper conductor bare.
  - 4. Bonding Conductor: Copper conductor insulated.
  
- C. Mechanical Connectors:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

- D. Exothermic Connections:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

### 1.3. EXECUTION

- A. Examination:
  - 1. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
  - 2. Verify final backfill and compaction has been completed before driving rod electrodes.
- B. Preparation: Remove paint, rust, mill oils, surface contaminants at connection points.
- C. Existing Work:
  - 1. Modify existing grounding system to maintain continuity to accommodate renovations.
  - 2. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.
- D. Installation:
  - 1. Install in accordance with IEEE 142
  - 2. Install rod electrodes at indicated
  - 3. Install grounding and bonding conductors concealed from view.
  - 4. Install grounding well pipe with cover at. Install well pipe top flush with finished grade.
  - 5. Install 4 AWG bare copper wire in foundation footing.
  - 6. Bond together metal siding not attached to grounded structure; bond to ground.
  - 7. Bond together reinforcing steel and metal accessories in structures.
  - 8. Bond together each metallic raceway, pipe, duct and other metal object entering. Install AWG bare copper bonding conductor.
  - 9. Install isolated grounding conductor for circuits supplying in accordance with IEEE 1100.
  - 10. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
  - 11. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
  - 12. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type

- receptacles, and other exposed non-current carrying metal parts of electrical equipment.
13. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
  14. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
  15. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
  16. Permanently attach equipment and grounding conductors prior to energizing equipment.

E. Field Quality Control:

1. Inspect and test in accordance with NETA ATS, except Section 4.
2. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
3. Perform ground resistance testing in accordance with IEEE 142.
4. Perform leakage current tests in accordance with NFPA 99.
5. Perform continuity testing in accordance with IEEE 142.
6. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

## SECTION 26 05 29

### HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. Conduit supports.
  2. Formed steel channel.
  3. Spring steel clips.
  4. Sleeves.
  5. Mechanical sleeve seals.
  6. Fire stopping relating to electrical work.
  7. fire stopping accessories.
  8. Equipment bases and supports.
- B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.
  2. Section 27 05 29 - Hangers and Supports for Communications Systems.
  3. Section 28 05 29 - Hangers and Supports for Electronic Safety and Security.

##### 1.2 REFERENCES

- A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
  4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.
- D. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
  2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
  3. UL 1479 - Fire Tests of Through-Penetration Firestops.
  4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
  5. UL - Fire Resistance Directory.

- E. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.

### 1.3 DEFINITIONS

- A. Fire stopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

### 1.4 SYSTEM DESCRIPTION

- A. Fire stopping Materials: ASTM E119, ASTM E814, to achieve fire ratings
- B. Surface Burning: ASTM E84 with maximum flame spread / smoke developed rating of 25/450.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

### 1.5 PERFORMANCE REQUIREMENTS

- A. Fire stopping: Conform to applicable code FM for fire resistance ratings and surface burning characteristics.
- B. Fire stopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

### 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
  - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
  - 2. Fire stopping: Submit data on product characteristics, performance and limitation criteria.
- D. Fire stopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- F. Manufacturer's Installation Instructions:
  - 1. Hangers and Supports: Submit special procedures and assembly of components.

- 2. Fire stopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

## 1.7 QUALITY ASSURANCE

- A. Through Penetration Fire stopping of Fire Rated Assemblies: ASTM E814 with 0.10-inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
  - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
  - 2. Floor Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
    - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Fire stopping of Non-Fire Rated Floor Assemblies: Materials to resist free passage of flame and products of combustion.
  - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
  - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10-inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with
- G. Maintain one copy of each document on site.

## 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum years' experience.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

## 1.10 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply fire stopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of fire stopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

## **PART 2 PRODUCTS**

### 2.1 CONDUIT SUPPORTS

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- D. Conduit clamps - general purpose: One-hole malleable iron for surface mounted conduits.
- E. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

### 2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

## 2.3 SPRING STEEL CLIPS

- A. Product Description: Mounting hole and screw closure.

## 2.4 SLEEVES

- A. Furnish materials in accordance with
- B. Sleeves for Through Non-Fire Rated Floors: 18 gage thick galvanized steel.
- C. Sleeves for Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- D. Sleeves for Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- E. Stuffing Insulation: Glass fiber type, non-combustible.

## 2.5 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

## 2.6 FIRESTOPPING

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
  - 1. Silicone fire stopping Elastomeric fire stopping: Single component silicone elastomeric compound and compatible silicone sealant.
  - 2. Foam Fire stopping Compounds: Single component foam compound.
  - 3. Formulated Fire stopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
  - 4. Fiber Stuffing and Sealant Fire stopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
  - 5. Mechanical fire stopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
  - 6. Intumescent fire stopping: Intumescent putty compound which expands on exposure to surface heat gain.
  - 7. Firestop Pillows: Formed mineral fiber pillows.



- C. Color: Dark gray.

## 2.7 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by fire stopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent:
  - 1. Mineral fiberboard.
  - 2. Mineral fiber matting.
  - 3. Sheet metal.
  - 4. Plywood or particle board.
  - 5. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
  - 1. Furnish UL listed products.
  - 2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
  - 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
  - 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive fire stopping.

### 3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of fire stopping material.
- B. Remove incompatible materials affecting bond.

- C. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- D. Obtain permission from Architect/Engineer before drilling or cutting structural members.

### 3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Provide precast inserts, powder actuated anchors and preset inserts.
  - 2. Steel Structural Elements: Provide beam clamps.
  - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide hollow wall fasteners.
  - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
  - 6. Sheet Metal: Provide sheet metal screws.
  - 7. Wood Elements: Provide wood screws.
- B. Inserts:
  - 1. Install inserts for placement in concrete forms.
  - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- C. Install conduit and raceway support and spacing in accordance with NEC.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
  - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
  - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
  - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
  - 4. Support vertical conduit at every other floor.
- G. Install Work in accordance with

### 3.4 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit, and other items, requiring fire stopping.
- B. Apply primer where recommended by manufacturer for type of fire stopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply fire stopping material in sufficient thickness to achieve required fire and smoke rating.
- D. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
- E. Place intumescent coating in sufficient coats to achieve rating required.
- F. Remove dam material after fire stopping material has cured.
- G. Fire Rated Surface:
  - 1. Seal opening at floor, ceiling, as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    - b. Size sleeve allowing minimum of 1-inch void between sleeve and building element.
    - c. Pack void with backing material.
    - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
  - 2. Where cable tray, bus, cable bus, conduit, wireway, trough, penetrates fire rated surface, install fire stopping product in accordance with manufacturer's instructions.
- H. Non-Rated Surfaces:
  - 1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    - b. Size sleeve allowing minimum of 1-inch void between sleeve and building element.
    - c. Install type of fire stopping material recommended by manufacturer.
  - 2. Install escutcheons floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
  - 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.

4. Interior partitions: Seal pipe penetrations at telecommunication rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

### 3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

### 3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel escutcheons at finished surfaces.

### 3.7 FIELD QUALITY CONTROL

- A. Section: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed fire stopping for compliance with specifications and submitted schedule.

### 3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of fire stopping materials.

3.9 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

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END OF SECTION

## SECTION 26 05 33

### RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

#### 1.1 GENERAL

- A. Summary: Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. References:
1. American National Standards Institute:
    - a. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
    - b. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
    - c. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).
  2. National Electrical Manufacturers Association:
    - a. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
    - c. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
    - d. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
    - e. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
    - f. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
    - g. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- C. System Description:
1. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
  2. Underground More than 5 feet outside Foundation Wall: Provide rigid steel conduit or non-metallic conduit. Provide cast metal boxes or nonmetallic handhole.
  3. Underground Within 5 feet from Foundation Wall: Provide rigid steel conduit, or nonmetallic conduit. Provide cast metal or nonmetallic boxes.
  4. In or Under Slab on Grade: Provide rigid steel conduit, thickwall nonmetallic conduit. Provide cast or nonmetallic metal boxes.
  5. Outdoor Locations, Above Grade: Provide, intermediate metal conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
  6. In Slab Above Grade: Provide, intermediate metal conduit, or electrical metallic tubing. Provide cast boxes.

7. Wet and Damp Locations: Provide rigid steel conduit, or thickwall nonmetallic conduit. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
  8. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
  9. Exposed Dry Locations: Provide, electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- D. Design Requirements:
1. Minimum Raceway Size: 3/4 inch unless otherwise specified.
- E. Submittals:
1. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  2. Product Data: Submit for the following:
    - a. Flexible metal conduit.
    - b. Liquidtight flexible metal conduit.
    - c. Nonmetallic conduit.
    - d. Flexible nonmetallic conduit.
    - e. Nonmetallic tubing.
    - f. Raceway fittings.
    - g. Conduit bodies.
    - h. Surface raceway.
    - i. Wireway
    - j. Pull and junction boxes.
    - k. Handholes
  3. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- F. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
  2. Project Record Documents:
    - a. Record actual routing of conduits larger than 2 inches.
    - b. Record actual locations and mounting heights of outlet, pull, and junction boxes.
- G. Delivery, Storage, and Handling:
1. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
  2. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
  3. Protect PVC conduit from sunlight.

- H. Coordination:
  - 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
  - 2. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

## 1.2. PRODUCTS

- A. Metal Conduit:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Rigid Steel Conduit: ANSI C80.1.
  - 3. Rigid Aluminum Conduit: ANSI C80.5.
  - 4. Intermediate Metal Conduit (IMC): Rigid steel.
  - 5. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.
- B. Flexible Metal Conduit
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Product Description: Interlocked steel construction.
  - 3. Fittings: NEMA FB 1.
- C. Liquid tight Flexible Metal Conduit:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Description: Interlocked steel construction with PVC jacket.
  - 3. Fittings: NEMA FB 1.
- D. Electrical Metallic Tubing (EMT):
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Product Description: ANSI C80.3; galvanized tubing.
  - 3. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.
- E. Nonmetallic Conduit:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  - 2. Product Description: NEMA TC 2; Schedule 40 PVC.
  - 3. Fittings and Conduit Bodies: NEMA TC 3.
- F. Surface Metal Raceway:
  - 1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.



2. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.
  3. Finish: Gray enamel.
  4. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.
- G. Surface Nonmetal Raceway:
1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  2. Product Description: Plastic channel with fitted cover, suitable for use as surface raceway.
  3. Finish: Gray.
  4. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories, finish to match raceway.
- H. Wireway:
1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  2. Product Description: General purpose type wireway.
  3. Knockouts: Manufacturer's standard.
  4. Size: 6 x 6-inch 8 x 8 inch; length as indicated on Drawings.
  5. Cover: Screw cover
  6. Connector: Slip-in.
  7. Fittings: Lay-in type with removable top, bottom, and side; captive screws.
  8. Finish: Rust inhibiting primer coating with gray enamel finish.
- I. Outlet Boxes:
1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  2. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
    - a. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2-inch male fixture studs where required.
    - b. Concrete Ceiling Boxes: Concrete type.
  3. Nonmetallic Outlet Boxes: NEMA OS 2.
  4. Cast Boxes: NEMA FB 1, Type FD. Furnish gasketed cover by box manufacturer.
  5. Wall Plates for Unfinished Areas: Furnish gasketed cover.
- J. Pull and Junction Boxes:
1. Manufacturers:
    - a. Refer to section 26 00 01 for approved electrical manufacturers.
  2. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
  3. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

- K. Adjusting:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
  - 2. Adjust flush-mounting outlets to make front flush with finished wall material.
  - 3. Install knockout closures in unused openings in boxes.
  
- L. Cleaning:
  - 1. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
  - 2. Clean interior of boxes to remove dust, debris, and other material.
  - 3. Clean exposed surfaces and restore finish.

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END OF SECTION

## SECTION 26 05 53

### IDENTIFICATIONS FOR ELECTRICAL SYSTEMS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Nameplates.
  - 2. Labels.
  - 3. Wire markers.
  - 4. Conduit markers.
  - 5. Stencils.
  - 6. Underground Warning Tape.
  - 7. Lockout Devices.

##### 1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Submit manufacturer's catalog literature for each product required.
  - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.
- C. Samples:
  - 1. Submit two tags, actual size.
  - 2. Submit two labels, actual size.
  - 3. Submit samples of each type of identification products applicable to project.
  - 4. Submit nameplates, 4 x 4 inch ( mm) in size illustrating materials and engraving quality.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

##### 1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

##### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

- B. Installer: Company specializing in performing Work of this section three years' experience.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept identification products on site in original containers. Inspect for damage.
- C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

## **1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install labels only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

## **PART 2 PRODUCTS**

### **2.1 NAMEPLATES**

- A. Product Description: Laminated three-layer plastic with engraved black letters on white contrasting background color.
- B. Letter Size:
  - 1. 1/8 inch (3 mm) high letters for identifying individual equipment and loads.
  - 2. 1/4 inch (6 mm) high letters for identifying grouped equipment and loads.
- C. Minimum nameplate thickness: 1/8 inch (3 mm).

### **2.2 LABELS**

- A. Labels: Embossed adhesive tape, with 3/16 inch (5 mm) white letters on black background.

### **2.3 WIRE MARKERS**

- A. Description: Cloth tape, split sleeve, or tubing type wire markers.
- B. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number.
  - 2. :

## 2.4 CONDUIT AND RACEWAY MARKERS

- A. Description: Nameplate fastened with adhesive Labels fastened with adhesive.
- B. Color:
  - 1. Medium Voltage System:
  - 2. 480 Volt System: Black lettering on white background.
  - 3. 208 Volt System: Black lettering on white background.
- C. Legend:
  - 1. Medium Voltage System: HIGH VOLTAGE.
  - 2. 480 Volt System: 480 VOLTS.
  - 3. 208 Volt System: 208 VOLTS.
  - 4. System:

## 2.5 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
  - 1. Up to 2 inches (50 mm) Outside Diameter of Raceway: 1/2 inch (13 mm) high letters.
  - 2. 2-1/2 to 6 inches (64 to 150 mm) Outside Diameter of Raceway: 1 inch (25 mm) high letters.
- B. Stencil Paint: As specified in Section, semi-gloss enamel, colors conforming to the following:
  - 1. Black lettering on white background.

## 2.6 UNDERGROUND WARNING TAPE

- A. Description: 4 inch (100 mm) wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

### 3.2 EXISTING WORK

- A. Install identification on existing equipment to remain in accordance with this section.
- B. Install identification on unmarked existing equipment.
- C. Replace lost nameplates markers.
- D. Re-stencil existing equipment.

### 3.3 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
  - 1. Install nameplate parallel to equipment lines.
  - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
  - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
  - 4. Secure nameplate to equipment front using screws, rivets, or adhesive.
  - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
  - 6. Install nameplates for the following:
    - a. Switchboards.
    - b. Panelboards.
    - c. Transformers.
    - d. Service Disconnects.
- C. Label Installation:
  - 1. Install label parallel to equipment lines.
  - 2. Install label for identification of individual control device stations, and.
  - 3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
  - 1. Install wire marker for each conductor at each load connection.
  - 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
  - 3. Install labels at data outlets identifying patch panel and port designation as indicated on Drawings.
- E. Conduit Raceway Marker Installation:
  - 1. Install conduit raceway marker for each conduit raceway longer than 6 feet (2000 mm).
  - 2. Conduit Raceway Marker Spacing: 20 feet (6000 mm) on center.
- F. Underground Warning Tape Installation:
  - 1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

## SECTION 26 05 73

### ARC FLASH HAZARD ANALYSIS / SHORT-CIRCUIT/COORDINATION STUDY

#### PART 1 GENERAL

##### 1.01 SCOPE

- A. The contractor shall furnish short-circuit and protective device coordination studies as prepared by the electrical gear supplier.
- B. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in the current version of NFPA 70E -*Standard for Electrical Safety in the Workplace*. The arc flash hazard analysis shall be performed according to the IEEE Standard 1584 – 200x, the IEEE *Guide for Performing Arc-Flash Calculations*.
- C. The scope of the studies shall include new distribution equipment supplied under this contract.

##### 1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract.

##### 1.03 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - 1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
  - 2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
  - 3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
  - 4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
  - 5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
  - 6. IEEE 1584 -Guide for Performing Arc-Flash Hazard Calculations
- B. American National Standards Institute (ANSI):
  - 1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
  - 2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
  - 3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
  - 4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)

1. NFPA 70 -National Electrical Code, latest edition
2. NFPA 70E – Standard for Electrical Safety in the Workplace

#### **1.04 SUBMITTALS FOR REVIEW/APPROVAL**

- A. The studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

#### **1.05 SUBMITTALS FOR CONSTRUCTION**

- A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. A minimum of five (5) bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than five (5) copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Electronic PDF copies of the report shall be provided upon request.
- B. The report shall include the following sections:
1. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
  2. Short-Circuit Methodology Analysis Results and Recommendations
  3. Short-Circuit Device Evaluation Table
  4. Protective Device Coordination Methodology Analysis Results and Recommendations
  5. Protective Device Settings Table
  6. Time-Current Coordination Graphs and Recommendations
  7. Arc Flash Hazard Methodology Analysis Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels.
  8. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.
  9. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

#### **1.06 QUALIFICATIONS**

- A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.
- B. The Registered Professional Electrical Engineer shall be an employee of the equipment



manufacturer or an approved engineering firm.

## **PART 2 PRODUCT**

### **2.01 STUDIES**

- A. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E -Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D. This study shall also include short-circuit and protective device coordination studies.

### **2.02 DATA**

- A. Contractor shall furnish all data as required for the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and future motors and generators.
- C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.
- D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

### **2.03 SHORT-CIRCUIT ANALYSIS**

- A. Transformer design impedances shall be used when test impedances are not available.
- B. Provide the following:
  - 1. Calculation methods and assumptions
  - 2. Selected base per unit quantities
  - 3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis
  - 4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
  - 5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding

- adequacy or inadequacy of the equipment rating.
6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
- C. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the engineer performing the study.
- D. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short circuit ratings
  2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses
  3. Square D shall notify Owner in writing, of any circuit protective devices improperly rated for the calculated available fault current.

## **2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS**

- A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.
- B. Include on each TCC graph, a complete title with descriptive device names.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
- D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Plot the following characteristics on the TCC graphs, where applicable:
1. Electric utility's overcurrent protective device
  2. Medium voltage equipment overcurrent relays
  3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
  4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
  5. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves
  6. Medium voltage conductor damage curves
  7. Ground fault protective devices, as applicable
  8. Pertinent motor starting characteristics and motor damage points, where applicable
  9. Pertinent generator short-circuit decrement curve and generator damage point
  10. The largest feeder circuit breaker in each motor control center and applicable panelboard.
- F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.
- G. Provide the following:
1. A One-line diagram shall be provided which clearly identifies individual equipment

- buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
  3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
  4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram
  5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
  6. Square D shall notify Owner in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

## **2.05 ARC FLASH HAZARD ANALYSIS**

- A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D. The arc flash hazard analysis shall be performed in conjunction with the short-circuit analysis (Section 2.03) and the protective device time-current coordination analysis (Section 2.04)
- B. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.
- C. Circuits 240V or less where available bolted short circuit current is less than 10 kA may be omitted from the computer model and will be assumed to have a hazard risk category 0 per NFPA 70E Table 130.7(C)(9)(a), including footnote 3.
- D. Circuits 240V or less fed by transformers 112.5 kVA or less may be omitted from the computer model and will be assumed to have a hazard risk category 0 per IEEE 1584.
- E. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.
- F. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations
- G. The short-circuit calculations and the corresponding incident energy calculations for

multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable as well as any stand-by generator applications.

The Arc-Flash Hazard Analysis shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

- H. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors should be decremented as follows:
  - 1. Fault contribution from induction motors should not be considered beyond 5 cycles.
- I. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle, sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.
- J. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.
- K. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.
- L. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.
- M. Provide the following:
  - 1. Results of the Arc-Flash Hazard Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment

- classes and AFIE (Arc Flash Incident Energy) levels.
2. The Arc-Flash Hazard Analysis shall report incident energy values based on recommended device settings for equipment within the scope of the study.
  3. The Arc-Flash Hazard Analysis may include recommendations to reduce AFIE levels and enhance worker safety.

## **PART 3 EXECUTION**

### **3.01 FIELD ADJUSTMENT**

- A. Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.
  
- B. Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

### **3.02 ARC FLASH LABELS**

- A. Contractor shall provide a 4.0 in. x 4.0 in. thermal transfer type label of high adhesion polyester for each work location analyzed.
  
- B. The labels shall be designed according to the following standards:
  1. UL969 – Standard for Marking and Labeling Systems
  2. ANSI Z535.4 – Product Safety Signs and Labels
  3. NFPA 70 (National Electric Code) – Article 110.16
  
- C. The label shall include the following information:
  1. System Voltage
  2. Flash protection boundary
  3. Personal Protective Equipment category
  4. Arc Flash Incident energy value (cal/cm<sup>2</sup>)
  5. Limited, restricted, and prohibited Approach Boundaries
  6. Study report number and issue date
  
- D. Labels shall be printed by a thermal transfer type printer, with no field markings.
  
- E. Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following:
  1. Floor Standing Equipment - Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with

multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.

2. Wall Mounted Equipment – Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.
3. General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to work.

### **Label Installation**

- F. Labels shall be field installed by the contractor.

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END OF SECTION

## SECTION 26 09 23

### LIGHTING CONTROL DEVICES

#### 1.1

##### GENERAL

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Summary: Section includes photoelectric sensors, and occupancy sensors.
- C. Submittals:
  - 1. Product Data: Include dimensions and data on features, components, and ratings for lighting control devices.
  - 2. Maintenance Data: For lighting control devices to include in maintenance manuals specified in Division 1.
- D. Quality Assurance:
  - 1. Source Limitations: Obtain lighting control devices from a single source with total responsibility for compatibility of lighting control system components specified in this Section.
  - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use and installation conditions by a testing agency acceptable to authorities having jurisdiction.
  - 3. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.
  - 4. Comply with NFPA 70.
- E. Coordination: Coordinate features of devices specified in this Section with systems and components specified in other Sections to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions.

#### 1.2. PRODUCTS

- A. Manufacturers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Photoelectric Sensors:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.
    - b. Occupancy Sensors:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.
    - c. Time Clocks:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.
- B. General Lighting Control Device Requirements:
  - 1. Line-Voltage Surge Protection: Include in all 120- and 277-V solid-state equipment. Comply with UL 1449 and with ANSI C62.41 for Category A locations.
- C. Photoelectric Sensors:
  - 1. Description: Solid state, complying with UL 773A.
  - 2. Light-Level Monitoring Range: 0 to 3500 fc (0 to 37 673 lx).
  - 3. Indoor Ceiling- or Wall-Mounting Units: Semiflush, calibrated to detect adequacy of daylighting in perimeter locations, and arranged to turn artificial illumination on and off to suit varying intensities of available daylighting.
  - 4. Outdoor Sealed Units: Weathertight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.

- D. Occupancy Sensors:
  - 1. Ceiling-Mounting Units: Unit receives 24-V dc power from a remote source and, on sensing occupancy, closes contacts that provide signal input to a remote microprocessor-based lighting control system.
  - 2. Switch-Box-Mounting Units: Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts rated 800 W at 120-V ac, and 1000 W at 277-V ac, minimum.
  - 3. Operation: Refer to lighting control scope of work on drawings.
  - 4. Dual-Technology Type: Uses a combination of passive-infrared and ultrasonic detection methods to distinguish between occupied and unoccupied conditions for area covered. Technology or combination of technologies that controls each function (on or off) is selectable in the field by operating controls on unit.
- E. Time Clock
  - 1. Nema 1 enclosure wall mount.
  - 2. Commercial grade.
  - 3. Features as called for by the drawings; If not directed differently shall be electromechanical 24 hour 30a 2pole with spring backup.

### 1.3. EXECUTION

- A. Installation:
  - 1. Install equipment level and plumb and according to manufacturer's written instructions.
  - 2. Mount lighting control devices according to manufacturer's written instructions and requirements in Division 26 Section "Common Work Results for Electrical."
  - 3. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting devices.
- B. Control Wiring Installation:
  - 1. Install wiring between sensing and control devices according to manufacturer's written instructions and as specified in Division 26 Section "Conductors and Cables" for low-voltage connections and Division 26 Section "Voice and Data Systems" for digital circuits.
  - 2. Wiring Method: Install all wiring in raceway as specified in Division 26 Section "Raceways and Boxes."
  - 3. Wiring Method: Install all wiring in raceway as specified in Division 26 Section "Raceways and Boxes," unless run in accessible ceiling space and gypsum board partitions.
  - 4. Bundle, train, and support wiring in enclosures.
  - 5. Ground equipment.
  - 6. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- C. Identification:
  - 1. Identify components and power and control wiring according to Division 26 Section "Common Work Results for Electrical."
- D. Field Quality Control:
  - 1. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.
  - 2. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.
  - 3. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturers recommended torque values.
  - 4. Verify settings of photoelectric devices with photometer calibrated within previous six months.



5. Electrical Tests: Use caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
    - a. Continuity tests of circuits.
    - b. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
      - 1) Include testing of devices under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
  6. Correct deficiencies make necessary adjustments, and retest. Verify that specified requirements are met.
  7. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
  8. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
- E. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.
- F. Demonstration: Train Owner's maintenance personnel as specified below:
1. Train Owner's maintenance personnel on troubleshooting, servicing, adjusting, and preventive maintenance. Provide a minimum of three hours' training.
  2. Training Aid: Use the approved final version of maintenance manuals as a training aid.
  3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION

## SECTION 26 14 10

### WIRING DEVICES

#### 1.1 GENERAL

- A. Work Includes:
  - 1. Base Bid:
    - a. Electrical Contractor:
      - 1) Receptacles, connectors, switches, and finish plates.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- C. Definitions:
  - 1. GFCI: Ground-fault circuit interrupter.
  - 2. TVSS: Transient voltage surge suppressor.
- D. Submittals:
  - 1. See Section 01 33 00 – Shop Drawings, Product Data and Samples, for submittal procedures.
  - 2. Product Data: For each product specified.
  - 3. Shop Drawings: Legends for receptacles and switch plates.
  - 4. Samples: For devices and device plates for color selection and evaluation of technical features.
  - 5. Maintenance Data: For materials and products to include in maintenance manuals specified in Section 01 73 00.
- E. Quality Assurance:
  - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
  - 2. Comply with NEMA WD 1.
  - 3. Comply with NFPA 70.
- F. Coordination:
  - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
    - a. Cord and Plug Sets: Match equipment requirements.

#### 1.2. PRODUCTS

- A. Manufacturers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Wiring Devices:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.
    - b. Wiring Devices for Hazardous (Classified) Locations:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.
    - c. Multi-outlet Assemblies:
      - 1) Refer to section 26 00 01 for electrical approved manufacturers.

- B. Receptacles:
1. Straight-Blade and Locking Receptacles: Specification grade.
  2. GFCI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.
  3. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap.
    - a. Devices: Listed and labeled as isolated-ground receptacles.
    - b. Isolation Method: Integral to receptacle construction and not dependent on removable parts.
  4. TVSS Receptacles: Duplex type, NEMA WD 6, Configuration 5-20R, with integral TVSS in line to ground, line to neutral, and neutral to ground.
    - a. TVSS Components: Multiple metal-oxide varistors; rated a nominal clamp level of 500 transient-suppression voltage and minimum single transient pulse energy dissipation of 140 J line to neutral, and 70 J line to ground and neutral to ground.
    - b. Active TVSS Indication: Light visible in face of device to indicate device as "active" or "no longer active."
    - c. Identification: Distinctive marking on face of device denotes TVSS-type unit.
  5. Industrial Heavy-Duty Receptacle: Comply with IEC 309-1.
  6. Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.
- C. Cord and Plug Sets:
1. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
    - a. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket. Green-insulated grounding conductor, and equipment-rating ampacity plus a minimum of 30 percent.
    - b. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.
- D. Switches:
1. Snap Switches: Specification grade, quiet type.
  2. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
    - a. Switch: 20 A, 120/277-V ac.
    - b. Receptacle: NEMA WD 6, Configuration 5-20R.
  3. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters.
    - a. Control: Continuously adjustable slide, or toggle. Single-pole or three-way switch to suit connections.
    - b. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle, or slide; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch (130-mm) wire connecting leads.

- c. LED Lamp Dimmers: Modular; compatible with drivers capable of consistent dimming to a maximum of 1 percent of full brightness.
- E. Wall Plates: Single and combination types match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Heavy plastic, specification grade, color/finish as directed by Architect.
  - 3. Material for Unfinished Spaces: Galvanized steel.
- F. Floor Service Fittings:
  - 1. Type: Modular, flush-type, dual-service units suitable for wiring method used.
  - 2. Type: Modular, above-floor, dual-service units suitable for wiring method used.
  - 3. Compartmentation: Barrier separates power and signal compartments.
  - 4. Housing Material: Die-cast aluminum, satin finished.
  - 5. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
  - 6. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.
- G. Multioutlet Assemblies:
  - 1. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
  - 2. Raceway Material: Metal, with manufacturer's standard finish.
  - 3. Wire: as indicated by drawings. Refer to drawings for additional specification
- H. Telephone/Power Service Poles:
  - 1. Poles: Nominal 2.5-inch- (65-mm-) square cross section with height adequate to extend from floor to at least 6 inches (150 mm) above ceiling, and separate channels for power and signal wiring.
  - 2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports, and pole foot with carpet pad attachment.
  - 3. Finishes: One of manufacturers standard finish and trim combinations, including painted and satin anodized-aluminum finishes and wood-grain-type trim.
  - 4. Wiring: as indicated by drawings.

### 1.3. EXECUTION

- A. Installation:
  - 1. Install devices and assemblies' plumb and secure.
  - 2. Install wall plates when painting is complete.
  - 3. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.
  - 4. Do not share neutral conductor on load side of dimmers.
  - 5. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
  - 6. Protect devices and assemblies during painting.
  - 7. Adjust locations at which floor service outlets are installed to suit arrangement of partitions and furnishings.
- B. Identification:

1. Comply with Section 26 05 00 - "Common Work Results for Electrical."
  - a. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
  - b. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.
- C. Connections:
  1. Connect wiring device grounding terminal to outlet box with bonding jumper.
  2. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.
  3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Field Quality Control:
  1. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.
  2. Check TVSS receptacle indicating lights for normal indication.
  3. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
  4. Replace damaged or defective components.
- E. Cleaning: Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

## SECTION 26 51 00

### INTERIOR LIGHTING

#### 1.1 GENERAL

- A. Work Includes:
1. Base Bid: Electrical contractor.
  2. Provide and install all interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- C. Submittals:
1. See Section 01 33 00 – Shop Drawings, Product Data and Samples, for submittal procedures.
  2. Product Data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
    - a. Dimensions of fixtures.
    - b. Certified results of independent laboratory tests for fixtures and lamps for electrical ratings and photometric data.
    - c. Certified results of laboratory tests for fixtures and lamps for photometric performance.
    - d. Emergency lighting unit battery and charger.
    - e. Fluorescent and high-intensity-discharge ballasts.
    - f. Air and Thermal Performance Data: For air-handling fixtures. Furnish data required in "Submittals" Article in Section 23 33 00 - "Diffusers, Registers, and Grilles."
    - g. Sound Performance Data: For air-handling fixtures. Indicate sound power level and sound transmission class in test reports certified according to ADC.
    - h. Types of lamps.
  3. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, method of field assembly, components, features, and accessories.
    - a. Wiring Diagrams: Detail wiring for fixtures and differentiate between manufacturer-installed and field-installed wiring.
- D. Quality Assurance:
1. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
  2. Comply with NFPA 70.
  3. FM Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM.
  4. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

- E. Coordination:
  - 1. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.
- F. Warranty:
  - 1. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

## 1.2. PRODUCTS

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Fixtures and Fixture Components, General:
  - 1. Metal Parts: Free from burrs, sharp corners, and edges.
  - 2. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
  - 3. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
  - 4. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
    - a. White Surfaces: 85 percent.
    - b. Specular Surfaces: 83 percent.
    - c. Diffusing Specular Surfaces: 75 percent.
    - d. Laminated Silver Metallized Film: 90 percent.
  - 5. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
    - a. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
    - b. Lens Thickness: 0.125-inch (3mm) minimum unless greater thickness is indicated.
- C. Fluorescent Lamp Ballasts:
  - 1. General Requirements: All ballasts shall comply with State of Illinois standards including the following:
    - a. Designed for type and quantity of lamps indicated at full light output.
    - b. Minimum power factor of 0.99
    - c. Total Harmonic Distortion Rating: Less than 10 percent.
    - d. Less than 6 percent third harmonic distortion.
    - e. Five-year manufacturer's warranty.
    - f. Compliance with applicable ANSI specifications.
    - g. Polychlorinated biphenyls (PCB) are not allowed.
    - h. Sound Rating: A

2. Additional requirements: Electronic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:
  - a. Certified Ballast Manufacturer Certification: Indicated by label.
  - b. Encapsulation: Without voids in potting compound.
  - c. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
  
3. Additional requirements: Ballasts for Compact Lamps in Recessed Fixtures: Unless otherwise indicated, additional features include the following:
  - a. Type: Electronic or electromagnetic, fully encapsulated in potting compound.
  - b. Operating Frequency: 20 kHz or higher.
  - c. Flicker: Less than 5 percent.
  - d. Lamp Current Crest Factor: Less than 1.7.
  - e. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
  
4. Additional requirements: Ballasts for Compact Lamps in Nonrecessed Fixtures: Unless otherwise indicated, additional features include the following:
  - a. Power Factor: 90 percent, minimum.
  - b. Ballast Coil Temperature: 65 deg C, maximum.
  - c. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
  
- D. Fluorescent Dimming Ballasts and Controls:
  1. Manufacturers:
    - a. Cooper Industries
    - b. Lutron Corp.
    - c. Advance Corp.
    - d. Hubbell Inc.
    - e. Pass & Seymour
    - f. Lithonia Corp.
  2. Product Description: Electrical assembly of control unit and ballast to furnish smooth dimming of fluorescent lamps.
  3. Control Unit: Linear slide type, rated 600 watts at 120 volts.
  4. Ballast: Selected by dimming system manufacturer as suitable for operation with control unit and suitable for lamp type and quantity specified for luminaire.
  
- E. LED Fixtures
  1. Fixtures shall be UP or Intertek ETL listed.
  2. Drivers shall be capable of accepting the voltage indicated on the plans or schedule and capable of dimming if required. The driver shall be class A sound less than 20 percent, rated for operation between -40C to 40C. Driver shall contain no PCB's.
  3. All LED fixtures shall be tested to IES LM-79 and IES LM-80.
  4. Fixtures shall have efficacy of 60 lumens per watt or greater.



5. Color Accuracy, CRI of 70 or greater. See schedule for light color. All fixtures shall have the same light color unless specifically called out otherwise.
  6. Outdoor fixtures shall be IP65 rated.
  7. LED driver and components shall have a system lifetime of 50000 hours or more at 25 Celsius.
  8. Fixture shall have a minimum of five-year warranty on all components and finishes.
- F. Exit Signs:
1. General Requirements: Comply with UL 924 and the following:
    - a. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.
  2. Internally Lighted Signs: As follows:
    - a. Lamps for AC Operation: LED
  3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
    - a. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
    - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    - c. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.
- G. Emergency Lighting Units:
1. General Requirements: Self-contained units. Comply with UL 924. Units include the following features:
    - a. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
    - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    - c. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.
    - d. Wire Guard: Where indicated, heavy-chrome-plated wire guard arranged to protect lamp heads or fixtures.
    - e. Integral Time-Delay Relay: Arranged to hold unit on for fixed interval after restoring power after an outage. Provides adequate time delay to permit high-intensity-discharge lamps to restrike and develop adequate output.
- H. Lamps:
1. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3000 K and 85 CRI, unless otherwise indicated.
  2. Noncompact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.

- I. Fixture Support Components:
  - 1. Comply with Section 260500 - "Basic Electrical Materials and Methods," for channel- and angle-iron supports, and nonmetallic channel and angle supports.
  - 2. Single-Stem Hangers: 1/2-inch (12-mm) steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
  - 3. Twin-Stem Hangers: Two, 1/2-inch (12mm) steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
  - 4. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
  - 5. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
  - 6. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.
  
- J. Finishes:
  - 1. Fixtures: Manufacturer's standard, unless otherwise indicated.
    - a. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
    - b. Metallic Finish: Corrosion resistant.

### 1.3. EXECUTION

- A. Installation:
  - 1. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
  - 2. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
    - a. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners.
    - b. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
    - c. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
  - 3. Suspended Fixture Support: As follows:
    - a. Pendants and Rods: Where longer than 48 inches (1200), brace to limit swinging.
    - b. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
    - c. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
    - d. Continuous Rows: Suspend from cable installed according to fixture manufacturer's written instructions and details on Drawings.
  - 4. Air-Handling Fixtures: Install with dampers closed.
  
- B. Connections:

1. Ground Equipment: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- C. Field Quality Control:
1. Inspect each installed fixture for damage. Replace damaged fixtures and components.
  2. Advance Notice: Give dates and times for field tests.
  3. Provide instruments to make and record test results.
  4. Tests: As follows:
    - a. Verify normal operation of each fixture after installation.
    - b. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
    - c. Verify normal transfer to battery source and retransfer to normal.
    - d. Report results in writing.
  5. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
  6. Corrosive Fixtures: Replace during warranty period.
- D. Cleaning and Adjusting:
1. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
  2. Adjust aimable fixtures to provide required light intensities.
- E. Interior Lighting Fixture Schedule: See contract drawings.

END OF SECTION

**SECTION 26 52 00**  
**EMERGENCY LIGHTING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes emergency lighting units and exit signs.

**1.2 REFERENCES**

- A. National Electrical Manufacturers Association:
  - 1. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

**1.3 SYSTEM DESCRIPTION**

- A. Emergency lighting to comply with requirements.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit dimensions, ratings, and performance data.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

**PART 2 PRODUCTS**

**2.1 EMERGENCY LIGHTING UNITS**

- A. Manufacturers:
  - 1. Refer to section 26 00 01 for approved electrical manufacturers.
- B. Product Description: Self-contained incandescent emergency lighting unit.
- C. Battery: 6 12 volt, nickel-cadmium type, with 1.5 hour capacity.
- D. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
- E. Lamps: 12 watt minimum, sealed beam type in nickel or chrome plated steel housing.

- F. Remote Fixtures: Match fixtures on unit.
- G. Housing: White plastic.
- H. Indicators: Lamps to indicate AC ON and RECHARGING.
- I. TEST switch: Transfers unit from external power supply to integral battery supply.
- J. Electrical Connection: Conduit connection.
- K. Input Voltage: 120 volts.

## 2.2 EXIT SIGNS

- A. Manufacturers:
  - 1. Cooper Industries
  - 2. General Signal Corp.
  - 3. Mule Emergency Lighting
  - 4. Lithonia Lighting
- B. Product Description: Exit sign fixture.
- C. Directional Arrows: As indicated on Drawings Universal type for field adjustment.
- D. Mounting: Universal, for field selection.
- E. Battery: 6 12 volt, nickel-cadmium type, with 1.5 hour capacity.
- F. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
- G. Lamps: LED, 5 W per side, maximum.
- H. Input Voltage: 120 277 volts.
- I. Accessories.

## PART 3 EXECUTION

### 3.1 EXISTING WORK

- A. Disconnect and remove abandoned emergency lighting units, exit signs, lamps, and accessories.
- B. Extend existing emergency lighting and exit sign installations using materials and methods compatible with existing installations, or as specified.

- C. Clean and repair existing emergency lighting units and exit signs remaining or are to be reinstalled.

### 3.2 INSTALLATION

- A. Install suspended exit signs using pendants supported from swivel hangers. Install pendant length required to suspend sign at indicated height.
- B. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- C. Install wall-mounted emergency lighting units and exit signs at height as indicated on Drawings.
- D. Install accessories furnished with each emergency lighting unit and exit sign.
- E. Connect emergency lighting units and exit signs to branch circuit outlets provided in Section 26 05 33 as indicated on Drawings.
- F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within unit.
- G. Install specified lamps in each emergency lighting unit and exit sign.
- H. Ground and bond emergency lighting units and exit signs in accordance with Section 26 05 26.

### 3.3 FIELD QUALITY CONTROL

- A. Section: Field inspecting, testing, adjusting, and balancing.
- B. Operate each unit after installation and connection. Inspect for proper connection and operation.

### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Aim and adjust lamp fixtures.
- C. Position exit sign directional arrows as indicated on Drawings.

### 3.5 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

- B. Relamp emergency lighting units and exit signs having failed lamps at Substantial Completion.

END OF SECTION

SECTION 265100 - INTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

A. Interior Luminaires and Accessories.

1. Exit Signs.
2. Ballasts.
3. LED Drivers.
4. LED Light Fixtures.
5. Lamps.

1.3 REFERENCES

- A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
  - B. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
  - C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
  - D. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
  - E. NFPA 70 - National Electrical Code.
  - F. NFPA 101 - Life Safety Code.
  - G. IESNA LM-79-08 - Electrical and Photometric Measurements of Solid State Lighting Products.
  - H. IESNA LM-80-08 - Measuring Lumen Maintenance of LED Light Sources.
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- I. UL 8750 - Underwriters Laboratories Safety Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.4 SUBMITTALS FOR REVIEW

- A. See Division 01 for project requirements.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on dimensions, features, performance data, accessories, and finishes.

1.5 QUALITY ASSURANCE

- A. Energy Code Compliance: Applicable requirements in International Energy Conservation Code - 2015

1. Section C405 - "Electrical Power and Lighting Systems."

2. Section C408.3 - "Lighting System Functional Testing."

#### 1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

#### 1.7 REGULATORY REQUIREMENTS

A. Conform to the 2016 Health/Life Safety Code for Public Schools, 23 Illinois Administrative Code 180.

B. Conform to the 2015 International Building Code (IBC).

C. Conform to the 2015 International Existing Building Code (IEBC).

D. Conform to the 2015 International Fuel Gas Code (IFGC).

E. Conform to the 2015 International Property Maintenance Code (IPMC).

F. Conform to the 2015 International Fire Code (IFC), excluding Chapter 4.

G. Conform to the 2015 International Energy Conservation Code (IECC).

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H. Conform to the 1997 Illinois Accessibility Code, 71 Illinois Administrative Code 400.

I. Conform to 2014 State of Illinois Plumbing Code, 77 Illinois Administrative Code 890.

J. Conform to the 2013 Illinois State Fire Marshall Boiler and Pressure Vessel Safety Act, 41 Illinois Administrative Code 120.

K. Conform to the 2015 International Mechanical Code (IMC).

L. Conform to the 2015 ICC Electrical Code.

M. Conform to 2014 NFPA 70, National Electrical Code.

N. Conform to 2013 NFPA 72, National Fire Alarm Code.

O. Products: Listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose specified and indicated.

#### 1.8 WARRANTY

A. General Warranty: Special warranty specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranties for LED Drivers: Written warranty, executed by manufacturer agreeing to replace LED drivers that fail in materials or workmanship within specified warranty period.

1. Special Warranty Period for LED Drivers: Five years from date of manufacture.

### PART 2 - PRODUCTS

#### 2.1 LUMINAIRES

A. Furnish Products with features, options and accessories as scheduled.

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#### 2.2 LED DRIVERS

A. Minimum Efficiency: 85% at full load.

B. Minimum Operating Ambient Temperature: -20°C. (-4°F).



- C. Input Voltage: 120-277V ( $\pm 10\%$ ) at 60 Hz.
- D. Integral short circuit, open circuit, and overload protection.
- E. Power Factor:  $> 0.90$ .
- F. Total Harmonic Distortion:  $< 20\%$ .
- G. LED drivers shall have a fully isolated 0-10V control inputs.
- H. All LED drivers shall be capable of 0-10V dimming with linear dimming curve.

### 2.3 LED FIXTURES

A. LED fixtures shall be designed as a complete unit consisting of a fully factory assembled unit or as a system of manufacture designed components intended for use as a UL listed complete assembly. The use of retrofit kits or lamps in standard fluorescent, HID or incandescent light fixtures is not acceptable.

### 2.4 EXIT SIGNS

- A. Furnish Products as scheduled.
- B. General Requirements: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- C. Lamps: LEDs, 50,000 hours minimum rated lamp life.

### 2.5 EMERGENCY LIGHTING UNITS

- A. Furnish Products as scheduled.
  - B. General Requirements: Self-contained units complying with UL 924.
  - C. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - D. Charger: Fully automatic, solid-state type with sealed transfer relay.
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- E. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  - F. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  - G. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  - H. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
  - I. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Where required install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- B. Support luminaires independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling

directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips. Reuse existing supports if applicable.

F. Install recessed luminaires to permit removal from below.

G. Install recessed luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating.

H. Install clips to secure recessed grid-supported luminaires in place.

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I. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on drawings or as required to serve intended purpose.

J. Install accessories furnished with each luminaire.

K. Connect luminaires, emergency lighting units and exit signs to branch circuit outlets provided under Section 26 05 33 using flexible conduit as indicated.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Bond products and metal accessories to branch circuit equipment grounding conductor.

N. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

O. Prior to installation exit sign may require field relocation to accommodate ceiling heights, structure, Fire Inspector requirements or aesthetics, include relocation of within ten feet of location shown.

### 3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

### 3.3 ADJUSTING

A. Aim and adjust luminaires as indicated or as required to serve intended purpose.

B. Position exit sign directional arrows as required.

### 3.4 CLEANING

A. See Division 01 for project requirements.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosures.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

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### 3.5 PROTECTION OF FINISHED WORK

A. See Division 01 for project requirements.

B. Replace failed or faulty LED modules or LED drivers at Substantial Completion.

END OF SECTION 265100

Project

## SECTION 27 13 43

### COMMUNICATIONS SERVICES CABLING

#### PART 1 GENERAL

##### A. SUMMARY

1. Section includes and backboards, termination devices, outlets, and premises wiring.

##### B. REFERENCES

###### A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

###### B. National Fire Protection Association:

1. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

###### C. Telecommunications Industry Association/Electronic Industries Alliance:

1. TIA/EIA 568 - Commercial Building Telecommunications Cabling Standard.
2. TIA/EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.

###### D. Underwriters Laboratories, Inc.:

1. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces.

##### C. SYSTEM DESCRIPTION

A. Telecommunications Utility Company: existing.

B. Horizontal Pathway: Conform to TIA/EIA 569, using raceway, backboards as indicated on Drawings.

C. Entrance Wiring: Existing.

D. Backbone Wiring: existing.

E. Horizontal Wiring: Complete from telecommunications closet to each outlet using unshielded horizontal cables.

##### D. SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog data for each termination device, cable, and outlet device.

C. Test Reports: Indicate procedures and results for specified field testing and inspection.

E. CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations and sizes of pathways and outlets.

F. QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Provide combustible electrical equipment exposed within plenums with peak rate of heat release not greater than 100 kW, peak optical density not greater than 0.5, and average optical density not greater than 0.15 when tested in accordance with UL 2043.
- C. Perform Work in accordance with
- D. Maintain one copy of each document on site.

G. QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Installer: Company specializing in installing products specified in this section with minimum three years experience.
- C. Testing Agency: Company specializing in testing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

A. PATCH PANEL

- A. Product Description: TIA/EIA 568, wall-mounted or rack-mounted assembly of terminals and accessory patch cords, with adequate capacity for active and spare circuits.

B. TELEPHONE OUTLET JACKS

- A. Product Description: Conform to TIA/EIA 568 requirements for cable connectors for specific cable types.

C. UNSHIELDED HORIZONTAL CABLE

- A. Product Description: TIA/EIA 568, Cat5e, 100-ohm, unshielded twisted pair plenum rated noncombustible cable with 4 pairs, 22 AWG copper conductor.

## PART 3 EXECUTION

### A. EXISTING WORK

- A. Remove exposed abandoned telecommunications cables and pathways, including abandoned cables and pathways above accessible ceiling finishes. Cut flush with walls and floors, and patch surfaces.
- B. Disconnect and remove abandoned telecommunications equipment.
- C. Maintain access to existing telecommunications equipment, cabling, and terminations and other installations remaining active and requiring access. Modify installation or provide access panel.
- D. Extend existing telecommunications installations using materials and methods compatible with existing installations, or as specified.
- E. Clean and repair existing telecommunications equipment remaining or is to be reinstalled.

### B. INSTALLATION

- A. Install pathways in accordance with TIA/EIA 569.
- B. Install wire and cable in accordance with TIA/EIA 568.
- C. Finish paint termination backboards with durable enamel in accordance with Section prior to installation of telephone equipment.
- D. Install termination backboards plumb, and attach securely to building wall at each corner.
- E. Install engraved plastic nameplates in accordance with Section. Mark backboards and cabinets with legend "TELEPHONE.

### C. FIELD QUALITY CONTROL

- A. Section: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test optical fiber cables in accordance with NETA ATS, except Section 4. Perform inspections and tests listed in NETA ATS, Section 7.25.
- C. Inspect and test copper cables and terminations in accordance with TIA/EIA 568.

END OF SECTION

## SECTION 28 31 00

### FIRE DETECTION AND ALARM

#### 1.1 GENERAL

- A. Summary: Section includes addressable fire alarm control panels, manual fire alarm stations, automatic smoke and heat detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.
- B. References:
1. National Fire Protection Association:
    - a. NFPA 72 - National Fire Alarm Code.
    - b. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. System Description:
1. Fire Alarm System: NFPA 72, automatic local fire alarm system
  2. Alarm Sequence of Operation: Actuation of initiating device causes the following system operations:
    - a. Local fire alarm signaling devices sound and display with signal.
    - b. Zone-coded signal transmits to central station.
    - c. Location of alarm zone indicates on fire alarm control panel.
    - d. Signal transmits to building smoke removal system.
    - e. Signal transmits to building elevator control panel, initiating return to main floor or alternate floor and lockout for fire service.
    - f. Signal transmits to building mechanical controls, shutting down fans and operating dampers.
    - g. Signal transmits to release door hold-open devices.
    - h. Signal releases magnetic door hold opens.
    - i. Signal releases electric door locks.
  3. Drill Sequence of Operation: Manual drill function causes alarm mode sequence of operation.
  4. Trouble Sequence of Operation: System or circuit trouble causes the following system operations:
    - a. Visual and audible trouble alarm indicates at fire alarm control panel.
    - b. Visual and audible trouble alarm indicates at remote annunciator panel.
    - c. Trouble signal transmits to central station.
- D. Submittals:
1. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  2. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection; indicate annunciator layout, and.
  3. Product Data: Submit catalog data showing electrical characteristics and connection requirements.
  4. Test Reports: Indicate procedures and results for specified field testing and inspection.
  5. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.
- E. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
  2. Project Record Documents: Record actual locations of fire alarm equipment.
  3. Operation and Maintenance Data: Submit manufacturer's standard operating and maintenance instructions.

- F. Quality Assurance:
  1. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
  2. Perform Work in accordance with
  3. Maintain one copy of each document on site.
  
- G. Qualifications:
  1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
  2. Installer: Certified fire alarm installer with service facilities within miles of Project.
  
- H. Maintenance Service:
  1. Section 01 70 00 - Execution and Closeout Requirements: Maintenance service.
  2. Furnish service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.
  
- I. Maintenance Materials:
  1. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
  2. Furnish six keys of each type.
  
- J. Extra Materials: Refer to drawings

## 1.2 PRODUCTS

- A. Control Panel:
  1. Manufacturers:
    1. Fire Control Instruments, Inc.
    2. Gamewell Co. (The).
    3. Notifier; Div. of Pittway Corp.
    4. Potter
    5. Silent Knight.
    6. Simplex
  2. Product Description: Addressable fire alarm control panel with nema 1 enclosure.
  3. Power supply: Adequate to serve control panel modules, remote detectors, smoke dampers, relays, and alarm signaling devices. Include battery-operated emergency power supply with capacity for operating system in standby mode for 24 hours followed by alarm mode for 10 minutes.
  4. System Supervision: Component or power supply failure places system in trouble mode.
  5. Initiating Device Circuits: Supervised zone module with alarm and trouble indication; occurrence of single ground or open condition places circuit in trouble mode but does not disable circuit from initiating alarm.
  6. Indicating Appliance Circuits: Supervised signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode but does not disable circuit from signaling alarm.
  7. Auxiliary Relays: Sufficient SPDT auxiliary relay contacts to provide accessory functions specified.
  8. Refer to drawings for additional requirements.
  
- B. Manual Fire Alarm Stations:

1. Product Description: Manual single-action station with break-glass rod.
  2. Mounting: Surface.
  3. Type: Coded.
  4. Backbox: Manufacturer's standard.
- C. Spot Heat Detector:
1. Product Description: Fixed temperature, spot heat detector.
- D. Ceiling Smoke Detector:
1. Product Description: NFPA 72, ionization type or photoelectric type ceiling smoke detector with the following features:
    - a. Adjustable sensitivity.
    - b. Plug-in base.
    - c. Auxiliary relay contact.
    - d. Integral thermal element rated 135 degrees F.
    - e. Visual indication of detector actuation.
  2. Mounting: 4-inch outlet box.
  3. Furnish two-wire detector with common power supply and signal circuits.
- E. Duct-Mounted Smoke Detector:
1. Product Description: NFPA 72, ionization type with the following features:
    - a. Auxiliary SPDT relay contact.
    - b. Key-operated normal-reset-test switch.
    - c. Duct sampling tubes extending width of duct.
    - d. Visual indication of detector actuation.
    - e. Duct-mounted housing.
  2. Furnish two-wire detector with common power supply and signal circuits.
  3. Furnish and install on each air handling unit over 2000 cfm.
- F. Alarm Bells:
1. Product Description: NFPA 72, vibrating, electric bell with the following features:
    - a. Operating mechanism behind dome.
    - b. Integral strobe lamp and flasher with red lettered "FIRE" on white lens.
    - c. Size: 8 inch.
    - d. Sound Rating: 81 dB at 10 feet.
- G. Alarm Horn:
1. Product Description: NFPA 72, surface type fire alarm horn with the following features:
    - a. Sound Rating: 87 dB at 10 feet.
    - b. Integral strobe lamp and flasher with red lettered "FIRE" on white lens.
  2. Cable Located Exposed in Plenums: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.
  3. Fire alarm circuit conductors have insulation color or code as follows:
    - a. Power Branch Circuit Conductors: Black, red, white.
    - b. Initiating Device Circuit: Black, red.
    - c. Detector Power Supply: Violet, brown.
    - d. Signal Device Circuit: Blue (positive), white (negative).
    - e. Door Release: Gray, gray.

### 1.3 EXECUTION



- A. Examination:
  - 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
  - 2. Verify products and systems receiving devices are ready for installation.
  
- B. Existing Work:
  - 1. Remove exposed abandoned fire alarm wiring. Cut cable flush with walls and floors, and patch surfaces.
  - 2. Disconnect and remove abandoned fire alarm equipment.
  - 3. Maintain access to existing fire alarm equipment and other installations remaining active and requiring access. Modify installation or provide access panel.
  - 4. Extend existing fire alarm installations using materials and methods as specified.
  - 5. Clean and repair existing fire alarm equipment to remain or to be reinstalled.
  
- C. Installation:
  - 1. Install manual station with operating handle 4 feet 6 inches feet above floor.
  - 2. Install audible and visual signal devices 7 feet 6 inches feet above floor, or as indicated
  - 3. panel. box with last device or separate box adjacent to last device in circuit.
  - 4. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
  - 5. Connect conduit and wire to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors.
  - 6. Automatic Detector Installation: Conform to NFPA 72.
  - 7. Install engraved plastic nameplates in accordance with Section 28 05 00.
  - 8. Ground and bond fire alarm equipment and circuits in accordance manufacturer direction.
  
- D. Field Quality Control:
  - 1. Section: Field inspecting, testing, adjusting, and balancing.
  - 2. Test in accordance with NFPA 72 and local fire department requirements.
  
- E. Manufacturer's Field Services:
  - 1. Section 01 40 00 - Quality Requirements: Manufacturer's field services.
  - 2. Include services of technician to supervise installation, adjustments, final connections, and system testing.

END OF SECTION