

Project Manual



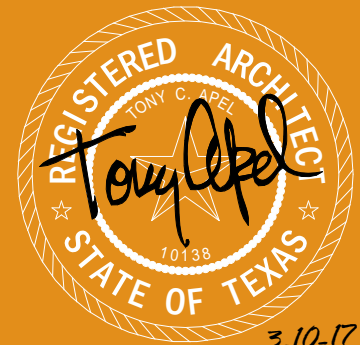
WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

Florence Rec. Center Renovation
2501 Whitson Way
Mesquite, Texas 75150

Invitation to Bid (ITB) No. 2017-044



City of Mesquite
1515 N. Galloway Ave.
Mesquite, Texas 75149
972-216-6201
www.cityofmesquite.com



JOB NO.	1638
DATE:	March 10, 2017

Division 00-32

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**SECTION 00 01 10
TABLE OF CONTENTS**

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12377 MERIT DRIVE SUITE 1800
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**PROJECT MANUAL FOR:
FLORENCE RECREATION CENTER RENOVATION (2017-004)
CITY OF MEQUITE
MESQUITE, TX 75149**

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

Advertisement for Bids (*separate document - published by City*)
00 01 12 - Project Team

PROPOSAL REQUIREMENTS

INVITATION TO BID PAGE 1

PROPOSAL DOCUMENTS

SPECIAL PROVISIONS	PAGE 4
CONFLICT OF INTEREST QUESTIONNAIRE	PAGE 5
STANDARDS OF CONDUCT	PAGE 8
INSURANCE	PAGE 10
NON-EXCLUSION AFFIDAVIT FOR GENERAL CONTRACTORS	PAGE 14
QUALIFICATION STATEMENT OF BIDDER	PAGE 15
REFERENCES	PAGE 16
BIDDERS LIST OF PROPOSED EQUIPMENT	PAGE 19
BIDDERS LIST OF PROPOSED SUBCONTRACTORS	PAGE 20
SUBCONTRACTORS LIST OF PROPOSED EQUIPMENT	PAGE 21
BEST VALUE MATRIX	PAGE 22
SCHEDULE OF PROPOSED ITEMS	PAGE 24
PROPOSED CONSTRUCTION SCHEDULE	PAGE 31
BID BOND	PAGE 32

CONTRACT FORMS

GENERAL PROVISIONS	PAGE 35
00490 - ADDENDA	PAGE 36
NOTICE	PAGE 37
SAMPLE FORM OF CONTRACT	PAGE 38
PERFORMANCE BOND FORM	PAGE 43
PAYMENT BOND FORM	PAGE 45
MEMO TO THE VENDOR	PAGE 45

SECTION TS - TECHNICAL SPECIFICATIONS

DIVISION 01 -- GENERAL REQUIREMENTS

OWNER'S ADMINISTRATIVE REQUIREMENTS

01300 - PROJECT MEETINGS
01310 - CONSTRUCTION SCHEDULES
01340 - MANUFACTURER'S DRAWINGS AND PRODUCT DATA
01400 - QUALITY CONTROL
01700 - PROJECT CLOSEOUT
01710 - CLEANING

GENERAL REQUIREMENTS

01 10 00 - Summary
01 23 00 - Alternates

QUALITY REQUIREMENTS

01 42 13 - Abbreviations and Acronyms

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - Temporary Facilities and Controls
--

PRODUCT REQUIREMENTS

01 60 00 - Product Requirements
01 61 16 - Volatile Organic Compound (VOC) Content Restrictions

DIVISION 02 -- OWNER'S SITE CONSTRUCTION SPECIFICATIONS

02515 - CAST IN PLACE CONCRETE (Sidewalks)
--

DIVISION 02 -- EXISTING CONDITIONS

02 41 00 - Demolition

DIVISION 04 -- MASONRY

04 05 11 - Masonry Mortaring and Grouting
04 20 00 - Unit Masonry

DIVISION 05 -- METALS

05 50 00 - Metal Fabrications

DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES

06 10 00 - Rough Carpentry

06 20 00 - Finish Carpentry

DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

07 90 05 - Joint Sealers

DIVISION 08 -- OPENINGS

08 11 13 - Hollow Metal Doors and Frames

08 71 00 - Door Hardware

08 80 00 - Glazing

08 83 00 - Mirrors

DIVISION 09 -- FINISHES

09 05 61 - Common Work Results for Flooring Preparation

09 21 16 - Gypsum Board Assemblies

09 51 00 - Acoustical Ceilings

09 65 00 - Resilient Flooring

09 65 66 - Resilient Athletic Flooring

09 65 67 - Resilient Athletic Flooring

09 67 00 - Fluid-applied Flooring

09 72 00 - Wall Coverings

09 90 00 - Painting and Coating

DIVISION 10 -- SPECIALTIES

10 14 00 - Signage

10 21 13.19 - Plastic Toilet Compartments

10 28 00 - Toilet Accessories

DIVISION 11 -- EQUIPMENT

11 66 23 - Gymnasium Equipment

DIVISION 12 -- FURNISHINGS

12 21 13 - Horizontal Louver Blinds

12 32 00 - Manufactured Casework

DIVISION 22 -- PLUMBING

22 05 00 - Common Work Results for Plumbing

22 42 00 - Plumbing Fixtures

DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

23 00 00 - Heating, Ventilating, and Air Conditioning (HVAC) Work

23 05 00 - Common Work Results for HVAC

23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

23 05 53 - Identification for HVAC Equipment and Piping

23 07 00 - Insulation

23 21 13 - Condensate Piping

23 23 00 - Refrigerant Piping

23 30 00 - HVAC Air Distribution

23 81 27 - Duct-free Split Systems

DIVISION 26 -- ELECTRICAL

26 00 01 - General Provisions

26 05 19 - Low-voltage Electrical Power Conductors and Cables

26 05 20 - Cable Connections

26 05 23 - Control - Voltage Electrical Power Cables

26 05 26 - Grounding and Bonding for Electrical Systems

26 05 29 - Hangers and Supports for Electrical Systems

26 05 32 - Raceways

26 05 33 - Boxes for Electrical Systems

26 24 16 - Panelboards

26 27 26 - Wiring Devices

26 28 16 - Enclosed Switches and Circuit Breakers

26 51 00 - Lighting

DIVISION 27 -- COMMUNICATIONS

27 10 00 - Communications Cabling General Requirements

END OF TABLE OF CONTENTS

**SECTION 00 01 12
PROJECT TEAM**

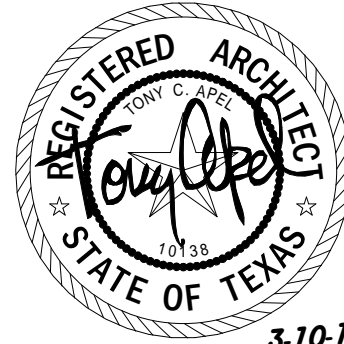
PROJECT TEAM:

1.01 OWNER:

City of Mesquite
1515 N. Galloway Ave.
Mesquite, Texas 75149
Phone: 972-216-6201
Web: www.cityofmesquite.com

1.02 ARCHITECT:

WRA Architects, Inc.
12377 Merit, Suite 1800
Dallas, Texas, 75251
Phone: 214-750-0077 Fax: 214-750-5931
Web: www.wraarchitects.com



1.03 GENERAL CONTRACTOR:

T.B.D.

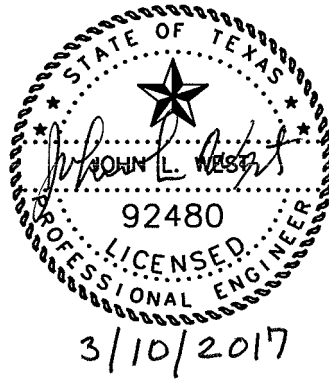
1.04 TECHNOLOGY CONSULTANT

True North Consulting Group
13284 Pond Springs Road, Suite 304
Austin, TX 78729
Phone: 512.451.5445
Web: www.tncg.com

1.05 MECHANICAL, PLUMBING, ELECTRICAL ENGINEERS:

Reed, Wells, Benson and Company
12001 N. Central Expressway, Suite 1100
Dallas, Texas, 75243
Phone: 972-788-4222 Fax: 972-788-0002
Web: www.rwb.net

END OF SECTION





INVITATION TO BID (ITB) NO. 2017- 044

CLOSING DATE AND TIME: TUESDAY, APRIL 4, 2017 - 2:00 P.M.

FLORENCE RECREATION CENTER RENOVATION

BIDS SHALL BE SUBMITTED ON THIS FORM

The City of Mesquite, Texas, invites, mailed or hand delivered bids from all qualified vendors desiring to bid on the **Florence Recreation Center Renovation**, complying with the following specifications as listed herein.

A pre-bid conference will be held at **10:00 a.m. on Tuesday, March 21, 2017** at **Florence Recreation Center** located at **2501 Whitson Way, Mesquite Texas**. Although it is not required, prospective bidders are encouraged to attend this conference to review the site conditions.

Address bids to Ryan Williams, Manager of Purchasing, City of Mesquite, P.O. Box 850137, Mesquite, Texas 75185-0137. Mark envelope in lower left corner "ITB NO. 2017-044; Florence Recreation Center Renovation," so the bids will not be opened until the appointed hour. Bids may also be submitted by courier or hand delivered **in a sealed envelope** to Ryan Williams, Manager of Purchasing, City of Mesquite, 1515 N. Galloway Avenue, Mesquite, Texas 75149. Bids submitted must be received before bid closing on **Tuesday, April 4, 2017 at 2:00 p.m.** Faxed or emailed bids will not be accepted on sealed bids.

GENERAL CLAUSES AND CONDITIONS

1. If you have questions regarding the preparation of your bid, you may contact Ryan Williams, Manager of Purchasing, City of Mesquite, telephone 972-216-6201 or email at purchasing@cityofmesquite.com.
2. If you do not intend to bid on this project, please complete the bottom portion of the bid sheet, mark bid sheet "NO BID" and return form to the Purchasing Department. Your assistance in this matter is greatly appreciated.
3. **Protection of Resident Workers:** The City of Mesquite actively supports the Immigration and Nationality Act (INA), which includes provisions addressing employment eligibility, employment verification, and nondiscrimination. Under the INA, employers may hire only persons who may legally work in the United States (i.e., citizens and nationals of the U.S.) and aliens authorized to work in the U.S. The employer must verify the identity and employment eligibility of anyone to be hired, which includes completing the Employment Eligibility Verification Form (I-9). The Contractor shall establish appropriate procedures and controls so no services or products under the Contract Documents will be performed or manufactured by any worker who is not legally eligible to perform such services or employment.
4. **Laws and Ordinances:** The Contractor shall at all times observe and comply with all Federal, State and local laws, ordinances and regulations which in any manner affect the Contract or the work, and shall indemnify

and save harmless the City against any claim arising from the violation of any such laws, ordinances and regulations whether by the Contractor or his employees.

5. Bidders desiring a copy of the bid tabulation sheet may request same by enclosing a self-addressed stamped envelope with bid. **BID RESULTS WILL NOT BE GIVEN BY TELEPHONE.** If you have any questions, please contact the City of Mesquite Purchasing Department at 972-216-6201. Or, check our Web site at www.cityofmesquite.com 24-hours after bid opening for a bid tabulation.
6. Bids must be **received in duplicate**, on this form, prior to the closing date and time to be considered. Bids must be submitted in sufficient time to be received and time-stamped at the above location on or before the published date and time shown on the ITB. The City of Mesquite will not be responsible for mail delivered from the post office. Bids received after the published time and date cannot be considered and will be returned unopened
7. Bidder shall attach official documentation from the State of Texas or other qualified certification agency of M/WBE status of your company with bid/proposal. This data is for informational purposes only and will not affect the bid award.
8. In submitting an offer, respondent certifies that they have not participated in nor have they been party to any collusion, price fixing or any other illegal or unethical agreements with any company, firm or person concerning the pricing offered.
9. A completed W-9 form will be required within five (5) business days by the apparent low bidder once notification has been received.
10. The attached Non-Exclusion Affidavit for General Contractor form shall be signed, notarized and submitted with bid.
11. All bids must be signed by an authorized representative of the company.
12. Any ambiguity in the bid as a result of omission, error, lack of clarity or non-compliance by the Bidder with specifications, instructions and all conditions shall be construed in favor of the City.
13. The City of Mesquite reserves the right to reject any and all bids, waive formalities and to make award of bid as may be deemed to the best advantage of the City. No bid may be withdrawn within forty-five (45) days after date of opening.
14. This Contract may be terminated at any time with thirty-(30) day's written notice by either the City of Mesquite or successful bidder.
15. Prices shall be filled in and extended on the bid sheet. In case of discrepancy between the unit price and the extension, the unit price will be taken.
16. Bidder shall complete all information requested and blanks provided shall be filled in on the bid sheet. Failure to completely describe the merchandise being bid may result in rejection of your bid.
17. The City is exempt from all sales and excise taxes.
18. The City of Mesquite reserves the right to evaluate variations from these specifications. If exceptions are made, bidder shall state wherein the merchandise fails to meet these specifications. Failure to completely describe the merchandise being bid may result in rejection of your bid.

19. Quantities are estimated and based on projected usage. It is specifically understood and agreed that these quantities are approximate and any increased quantities will be paid at the regular quoted price. The contractor shall not have any claim against the City of Mesquite for any quantities ordered that are less than the estimated bid amount.
20. Award of contract shall be made on an "all or nothing" basis at the discretion of the City of Mesquite.
21. It is the vendor's responsibility to check for any addendums that might have been issued before the bid closing date and time.
22. Cooperative Purchasing: As permitted under the Texas Local Government Code, Chapter 791025, other government entities may wish to also participate under the same terms and conditions contained in this contract (piggyback). Each entity wishing to piggyback must have prior authorization from the City of Mesquite and vendor. If such participation is authorized, all purchase orders will be issued directly from and shipped directly to the entity requiring supplies/services. The City of Mesquite shall not be held responsible for any orders placed, deliveries made or payment for supplies/services ordered by these entities. Each entity reserves the right to determine their participation in this contract.

Successful bidder agrees to extend prices to all entities that have entered into or will enter into joint purchasing interlocal cooperation agreements with the City of Mesquite _____Yes _____No.

23. The insurance requirements are included in the bid document. Bidders agree to provide and to maintain the required types of insurance for the term of the contract. An original certificate of insurance will be required within 10 business days by the apparent low bidder once notification has been received.
24. All BIDDERS must submit, with bid, either a Bid Bond, on the form provided herein, a Cashier's or Certified Check in the amount of five percent (5%) of the total bid.
25. The Contract, Performance bond and Payment bond forms are included for Bidders information so that Bidders may be familiar with their contents and requirements. **Bidder shall not fill in or execute these forms at time of bid submittal. Upon award of the bid the awarded vendor will be required to execute the contract.**
26. The Architect will **not** respond to any questions received after 5:00 p.m. March 30, 2017.
27. This project is being evaluated utilizing a "Best Value" method. Bid will be awarded through the Selection Criteria detailed in the invitation to bid documents.

SPECIAL PROVISIONS

1. **Bidders shall fill out the following required documents and submit with bid. If the following forms are not included, the bid may be considered non-responsive.**

Bid Check List:

- Conflict of Interest Form
- Non-Exclusion Affidavit for General Contractors
- Qualification Statement of Bidder
- References
- Bidder's List of Proposed Equipment
- Bidder's List of Proposed Sub Contractors
- Subcontractors List of Proposed Equipment
- Best Value Scoring Matrix
- Schedule of Proposed Items
- Advisement
- Contractor Signature Page
- Bid Bond/Cashier's Check/Certified Check

CONTRACTING WITH THE CITY OF MESQUITE

Updated: January 8, 2016

Conflict of Interest Questionnaire And Disclosure of Interested Parties (Form 1295)

YOU WILL BE REQUIRED TO COMPLY WITH THE FOLLOWING:

Chapter 176 of the Texas Local Government Code is an ethics law that was initially enacted by the Texas Legislature with HB 914 in 2005 that requires disclosure of employment and business relationships local government officers may have with contractors, consultants and vendors who conduct business with local government entities. The law applies to any written contract for the sale or purchase of real property, goods or services. Further information regarding Texas Conflict of Interest laws and the **Conflict of Interest Questionnaire** (FORM CIQ) can be found at the Texas Ethics Commission web site at the following web address:

https://www.ethics.state.tx.us/filinginfo/conflict_forms.htm

PLEASE COMPLETE THE ATTACHED FORM CIQ AND SUBMIT WITH YOUR RESPONSE.

Section 2252.908 of the Texas Government Code was enacted in 2015, by the Texas Legislature pursuant to HB 1295, which provides that a governmental entity may not enter into certain contracts with a business entity on or after January 1, 2016, unless the business entity submits a disclosure of interested parties (FORM 1295) to the governmental entity at the time the business entity submits the signed contract to the governmental entity. Further information regarding the disclosure of interested parties law and FORM 1295 can be found at the Texas Ethics Commission web site at the following web address:

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

PLEASE DO NOT COMPLETE FORM 1295 UNTIL YOU HAVE BEEN NOTIFIED OF CONTRACT AWARD AND REQUESTED TO ELECTRONICALLY FILE FORM 1295 WITH THE TEXAS ETHICS COMMISSION.

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.

Standards of Conduct

The City of Mesquite conducts business with the public, business partners, vendors and contractors under a set of rules to ensure that all City officials and employees discharge their duties in a manner designed to promote public trust and confidence in our city. This code of ethics, titled Standards of Conduct, is taken from the Mesquite City Code, Chapter 2, Art. IV, Sec 2-123.

The City wants you to be aware of the rules that its employees are required to follow while performing their services to you. A violation of state or federal statutes may occur if these rules are broken. It is hoped that by outlining these rules for you, your experience in dealing with the City of Mesquite will be both rewarding and satisfactory.

Acceptance of Gifts or Gratuities

Accepting gifts or gratuities by employees in consideration for the performance of their duties, or as an appreciation for their performance, is strictly prohibited.

- Please do not offer employees any gift, loans or any other thing of value.
- Employees may not receive any fee or compensation for their services from any source other than the City, so please don't offer.
- Please do not offer to buy meals for employees.
- Employees may accept coffee, tea, soft drinks, snacks, etc. when attending meetings in your office.
- Letters to supervisors for exceptional service by employees are always welcome.

Conflicts of Interest

Employees are prohibited from engaging in any outside activities that conflict with, or have the appearance of conflicting with, the duties assigned to them in the employment of the City.

- Please do not ask employees for any special favor or consideration that is not available to every other citizen.
- Please do not ask an employee to disclose any information that is not available to every other citizen through normal public information channels.
- Please do not offer to compensate the employee by offering to hire, or do business with any business entity of the employee or family member
- Do not ask employees to represent you or your company or make any recommendations on your behalf other than those that are a part of their official duties with the City.
- Please do not ask employees to endorse the products or services of your company.
- Please do not ask employees to hand out or post advertising materials.

Solicitation by City Employees

Employees may not solicit gifts, loans, or any other items of value from people doing City business that will be used by them personally.

- If you are asked to pay a fee for services that you believe is improper or illegal, please contact the City's ethic's officer at **972-329-8723**. (payments should only be made to designated cashiers or clerks)
- Employees are prohibited from taking retaliatory action against you for failing to comply with any request unless the request is within the scope of the employee's official duties for the City.

Use of City Equipment, Facilities and Resources

Use of City equipment, facilities and resources is authorized only for City purposes and for those activities permitted by City ordinance and policy.

- Please do not ask employees to use City equipment to run errands or perform tasks for your benefit.
- Employees may not perform tasks, nor conduct any business not related to their official duties while on City time.

Your Rights and Expectations

When dealing with employees of the City of Mesquite you have the right to honest, fair and impartial treatment. You may expect prompt, courteous and professional service from our employees who are expected to understand and practice good customer service skills. Employees are tasked to uphold the public trust through the ethical performance of their duties. We understand that the enforcement of regulatory guidelines and codes may sometimes be a cause for concern; however, you may rest assured that we are responsible to all of the citizens of Mesquite and our goal is to serve them to the best of our ability.

Should you have any concerns or questions concerning this information or the conduct of any of our employees please contact the City's ethics officer at 972-329-8723. All calls to the City's ethics officer are confidential and your name (or any other identifying information) will not be disclosed.

Cliff Keheley
City Manager



**INSURANCE VERIFICATION PROGRAM
LETTER OF AUTHORITY**

TO: All Awarded Vendors

RE: Insurance Verification

Dear Vendor:

The City of Mesquite has provided Insurance Certificate Administrators (ICA) authority to monitor certificates of insurance, endorsements and other policy information from our vendors and contractors. ICA will request, receive, evaluate and order corrections from such companies.

ICA will provide the City of Mesquite with verification that any insurance document your agent or insurer certifies conforms to the contract requirements.

It is necessary that you have your agent or insurer promptly cooperate with ICA by having them provide the information ICA requests.

All correspondence regarding certificates of insurance and insurance policy information for the City of Mesquite should be sent to the following address. There is no need to provide copies to the City of Mesquite.

City of Mesquite
c/o ICA
input@icaprogram.com
P.O. Box 2566
Fort Worth, TX 76113-2566
Phone: 817-332-5313

Please forward the enclosed instructions to your agent/broker. Thank you for your cooperation.

INSURANCE

A. AMOUNTS OF INSURANCE

Contractor agrees to provide and to maintain the following types and amounts of insurance, for the term of this Contract.

<u>Type</u>	<u>Amount</u>
1. <u>Worker's Compensation</u> and <u>Employer's Liability</u>	<u>Statutory Limits</u> \$100,000 per occurrence
2. <u>Commercial (Public Liability)</u> <u>including but not limited to:</u>	<u>Bodily Injury:</u> \$500,000 per person \$1,000,000 per occurrence and
A. Premises/Operations	
B. Independent Contractors	
C. Personal Injury	<u>Property Damage:</u>
D. Products/Complete Operations	\$500,000 per occurrence
E. Contractual Liability (insuring above indemnity provisions)	with <u>general aggregate</u> of \$1,000,000
3. <u>Business (Commercial)</u> <u>Automobile Policy:</u>	Combined Single Limit/ \$500,000

The preceding amounts notwithstanding, the City reserves the right to increase the minimum required insurance to be effective thirty (30) days after notice is sent to the address provided herein. The Contractor may pass through to the City all costs for obtaining the increase in the insurance coverage.

B. OTHER INSURANCE REQUIREMENTS

The Contractor understands that it is its sole responsibility to provide the required Certificate and that failure to comply within 10 business days after notice of award and according to the requirements of this article shall be a cause for termination of this Contract.

For any pesticide spraying performed, the City of Mesquite will require the successful bidder to carry Pollution Liability Insurance and Environmental Impairment Liability Insurance.

Insurance required herein shall be issued by a company or companies of sound and adequate financial responsibility and authorized to do business in the State of Texas. All policies shall be subject to examination and approval by the City Attorney's office for their adequacy as to form, content, form of protection, and providing company.

Insurance required by this Contract for the City, as additional insured shall be primary insurance and not contributing with any other insurance available to City, under any third party liability policy.

The Contractor further agrees that with respect to the above required insurances, the City shall:

1. Be named as additional insured/or an insured, on all required insurance except workers' compensation. Blanket Endorsements are acceptable in meeting this requirement if copies of the endorsements are provided along with the certificate. If using a form that has specific boxes labeled for additional insured, checking those specific boxes is acceptable in meeting this requirement as well.
2. Be provided with a waiver of subrogation, in favor of the City on all required insurance. Blanket Endorsements are acceptable in meeting this requirement if copies of the endorsements are provided along with the certificate. If using a form that has specific boxes labeled for waiver of subrogation, checking those specific boxes is acceptable in meeting this requirement as well.
3. Be provided with an unconditional 30 days' advance written notice of cancellation or material change.
4. Prior to execution of this Agreement, proof of insurance shall be provided through the office of the City Secretary with either their original Certificate of Insurance or their insurance policy evidencing the above requirements. Thereafter, new certificates or copies of the policies shall be furnished prior to the expiration date of any prior certificate.

C. ADDITIONAL WORKER'S COMPENSATION INSURANCE REQUIREMENTS

1. Definitions:
Certificate of coverage ("certificate") A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement showing statutory Worker's Compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

Duration of the project - includes the time from the beginning of the work on the project until the contractors'/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project (subcontractor" in 406.096) - includes all persons or entitles performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity or employees of any entity, which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.
2. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements. Which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for all employees of the contractor providing services on the project, for the duration of the project.
3. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.
4. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

5. The contract shall obtain from each person providing services on a project, and provide to the governmental entity:
 - (a) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage for all persons providing services on the project; and
 - (b) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.
6. The Contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

Non-Exclusion Affidavit for General Contractors

Federal, state, and local government agencies, not-profits, and other organizations that use federal money to fund all or part of any program or project are required to follow specific requirements regarding the use of such federal funds. One of these requirements is that no contract, subcontract, grant, financial assistance, or other forms of assistance provided using federal funds may be awarded to individuals or entities that have been suspended, debarred, or otherwise excluded from participation in federally funded programs.

The U.S. federal government maintains a Web site known as the "System for Award Management" (SAM) at www.sam.gov. One of the purposes of the SAM Web site is to provide a comprehensive list of all individuals, firms, and other entities that have been suspended, debarred, or otherwise excluded from participation in federally funded contracts, subcontracts, grants, etc. SAM provides a simple means of helping government, non-profit agencies, and other organizations ensure that they do not award federally-funded grants, contracts, subcontracts, or other financial or non-financial benefits to any individual, firm, or other entity that has been excluded by any agency from participation in such federally funded activities.

I, hereby certify that neither I, nor
(Contractor Representative)

_____, nor any
(Name of the company or organization I represent)

subcontractors that I or said company may employ to work on any federally funded activity have been suspended, debarred, or otherwise excluded by any federal agency from participation in any federally funded activity. I further acknowledge my understanding that, before entering into a contract with me or with the company or organization I represent, City of Mesquite staff will perform a search on www.sam.gov to verify whether I, the organization I represent, or any subcontractors I may employ to work on any federally funded activity, have been excluded from participation in any federally funded activity.

Signature of Contractor Representative Date

Sworn to and subscribed before me this _____ day of _____, 20_____

Notary Public in and for _____ County, _____ Texas

QUALIFICATION STATEMENT OF BIDDER

(TO BE SUBMITTED WITH BID)

City of Mesquite
Parks and Recreation Department
Park Planning Division
P.O. Box 850137
Mesquite, Texas 75185-0137
972-216-6421
972-216-8102 FAX

Bidder: _____

Date: _____

Check One:

Sole Proprietor

Partnership

Corporation

Joint Venture

Name: _____

Partner: _____

Address: _____

Address: _____

City: _____

City: _____

Phone: _____

Phone: _____

If the Proposer is a corporation, fill out the following:

State and County of Incorporation: _____

Location of Principal Office: _____

Contact Person(s) at Office: _____

Phone: _____

Fax: _____

List Officer of the Corporation and person(s) authorized to execute Contracts on Behalf of the Corporation:

Name: _____

Title: _____

Name(s) of any Licensed or
Certified Professionals: _____

License/Certificate No.: _____

How many years has your organization been in business? _____

Greatest number of contracts in excess of \$20,000 under construction at one time in company's history: .

Greatest number of contracts in excess of \$50,000 under construction at one time in company's history: .

Total approximate value of incomplete work outstanding: \$ _____

REFERENCES

List major projects of the type of work qualifying for or similar work completed in the last three years. Give the following information for each project:

1. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

2. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

3. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

4. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

5. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

REFERENCES (CONT.)

List major projects of the type of work qualifying for or similar work completed in the last three years. Give the following information for each project:

6. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

7. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

8. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

9. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

10. Project: _____

City: _____

Contact Person: _____ Phone: _____

Date of Completion: _____ Contract Price: _____

REFERENCES (CONT.)

List incomplete projects, including the following information for each incomplete project listed:

Project: _____

City: _____

Contact Person: _____ Phone: _____

Value of Incomplete Work: _____ Contract Price: _____

Project: _____

City: _____

Contact Person: _____ Phone: _____

Value of Incomplete Work: _____ Contract Price: _____

Have you or any present partner(s) or officer(s) failed to complete a contract? YES NO

If so, name of City and/or surety: _____

Contact Person: _____ Phone: _____

Bank Reference:

Bank: _____ City: _____

Address: _____ Phone: _____

Contact Officer: _____

Other Credit References:

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Phone: _____ Phone: _____

Municipal Reference:

City: _____

Contact Person: _____ Title: _____

Address: _____ Phone: _____

City of Mesquite

BIDDER'S LIST OF PROPOSED EQUIPMENT

Required information includes the make, model and year of the proposed equipment to be used on the project and whether the equipment is owned, leased, rented or borrowed. This form shall be completed and submitted at bid time.

GENERAL NAME OF THE EQUIPMENT AND VEHICLES TO BE USED ON THIS PROJECT (this does not include hand tools, small power tools, wheelbarrows, etc.)	MAKE/ MANUFACTURER	YEAR MODEL	STATUS OF OWNERSHIP; EXAMPLE: OWNED, LEASED, RENTED OR BORROWED
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

BIDDER'S LIST OF PROPOSED SUB-CONTRACTORS

Company

Type of Work to be Performed

Contact

Insurance Agent

Phone

Phone

Company

Type of Work to be Performed

Contact

Insurance Agent

Phone

Phone

Company

Type of Work to be Performed

Contact

Insurance Agent

Phone

Phone

Company

Type of Work to be Performed

Contact

Insurance Agent

Phone

Phone

City of Mesquite

SUBCONTRACTOR'S LIST OF PROPOSED EQUIPMENT

Required information includes the make, model and year of the proposed equipment to be used on the project and whether the equipment is owned, leased, rented or borrowed. This form shall be completed and submitted at bid time.

GENERAL NAME OF THE EQUIPMENT AND VEHICLES TO BE USED ON THIS PROJECT (this does not include hand tools, small power tools, wheelbarrows, etc.)	MAKE/ MANUFACTURER	YEAR MODEL	STATUS OF OWNERSHIP; EXAMPLE: OWNED, LEASED, RENTED OR BORROWED
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

**CONSTRUCTION OF Florence Recreation Center Renovation;
PROJECT 2017-044 BEST VALUE SCORING MATRIX**

Submit the completed form with the bid. Failure to submit the completed form with the bid shall be deemed as an incomplete bid.

<u>SELECTION CRITERIA:</u>	<u>POINTS</u>		<u>WEIGHT</u>		<u>SCORE</u>
<u>1. CONTRACT PRICE (Base Bid)</u>	<u>15</u>	<u>X</u>	<u>2</u>	<u>=</u>	<u>30</u>
The bidder with the lowest bid price will receive the maximum number of points, which is 15 points. The bidder with the next lowest price will receive a point score that is based on dividing their price into the lowest bid price and multiplying the resulting percentage by the total points; example using \$100,000 as the low bid and \$110,000 as second low bid: calculated as follows: $\$100,000/\$110,000 \times 15 \times 2 = 27$. Note: the contract price score is double weighted (multiplied by 2).					
<u>2. QUALITY OF THE VENDOR'S GOODS OR SERVICES</u>	<u>15</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>15</u>
The evaluation is based on the vendor history and experience with the City and the staff's research of the vendor's performance on similar type projects. Items of concern are: the quality of the workmanship of constructed improvements and the customer service during and after construction.					
<u>3. BIDDER'S SAFETY PROGRAM</u>	<u>10</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>10</u>
Bidder should describe and/or attached its construction site safety program illustrating a proactive approach to safety on the job.					

<u>4. BIDDER'S PROPOSED CONSTRUCTION EQUIPMENT</u>	<u>10</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>10</u>
City staff needs to know that the bidder owns or can obtain the appropriate equipment to successfully complete the project. The Bidders are required to use no less than the equipment listed in their proposals in the event they are awarded a contract. Bidders proposing improper equipment will score lower. The Bidder must list the model, make, year, and whether the equipment is owned, leased, rented or borrowed. This information shall be submitted at bid time.					
<u>5. BIDDER'S SUBMITTAL OF REFERENCES</u>	<u>15</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>15</u>
Each bidder may submit no more than 10 references of completed projects of similar scope and of similar cost. These projects shall have been completed within the past three (3) years. Contact name, phone numbers, and project addresses of the completed projects are required. It is not mandatory that a bidder submits all 10 references; bidders will be scored on experience on similar type and magnitude projects. All reference information shall be submitted at bid time and will be used to evaluate bidder qualifications.					
<u>6. BIDDER'S SUBCONTRACTORS / SUBCONTRACTOR'S CONSTRUCTION EQUIPMENT</u>	<u>10</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>10</u>
City staff will evaluate a combination of the subcontractor's experience and their proposed equipment. It is important that the general contractor work with subcontractor's who are either certified or very experienced in the nature of this type of work. The bidder must submit with their bid a list of proposed subcontractor's names and what services they will provide as well as indicating whether they own, rent, lease the equipment they will utilize.					
<u>7. PRE-BID CONFERENCE ATTENDANCE</u>	<u>5</u>	<u>X</u>	<u>1</u>	<u>=</u>	<u>5</u>
The bidders in attendance who arrive on time and stay until the end of the conference will receive a full score.					

The Bidders who arrive late or leave early will receive three (3) points. The Bidders who do not attend will receive a zero (0) score. Signing the attendance sheet at the Pre-bid Conference is the responsibility of the Bidder.					
<u>8. BIDDER'S REQUESTED TIME TO COMPLETE THE PROJECT</u>	<u>5</u>	<u>X</u>	<u>1</u>	=	<u>5</u>
<i>Time is of the essence to complete this project. Bidders that provide completion times greater than the duration indicated in this document will be downgraded relative to other bids received.</i>					

TOTAL POSSIBLE SCORE = 100

Schedule of Proposed Items

FLORENCE RECREATION CENTER RENOVATION

PLEASE PROVIDE A PRICE QUOTE FOR THE FOLLOWING:

For acquisition, delivery, installation, materials, labor, cleanup, incidentals and all appurtenances, and guarantee, all per plans, specifications, complete and in place. In the event of additions/deletions to the contract items, the price per unit shall be used to determine change order amounts.

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
1	1	LS	<p>For all items shown on the plans and described in the specifications herein. Scope of work to include, but not limited to, all Demolition, floor/wall/ceiling finishes, doors, casework, mechanical, electrical, plumbing, technology, project management and final cleaning. "Base Bid" Work fully performed, complete and in place for the sum of:</p> <p>_____</p> <p>Dollars and</p> <p>_____</p> <p>Cents Per Lump Sum.</p>	\$	\$

<p>Total Base Bid Proposal of Item "1," complete and in place, for the sum of:</p> <p>_____</p> <p>Dollars and</p> <p>_____</p> <p>Cents (written) LUMP SUM</p>	<p>\$ _____</p> <p>(figures) LUMP SUM</p>
---	---

ALTERNATES

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
Alt.1	1	LS	<p>Alternate #1: Remove existing pendant mounted fluorescent light fixtures and replace with Fixture Type "F" to existing ceiling mounted J boxes in Rooms 100, 10, 105, 106 and 109. Refer Electrical Drawings and Fixture Schedule.</p> <p>Work fully performed, complete and in place for the sum of: _____ Dollars and _____ Cents Per Lump Sum.</p>	\$ _____	\$ _____

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
Alt.2	1	LS	<p>Alternate #2: Provide and install resilient VCT flooring (12" x 12") with solid court line markings in Gym 139 per the Specification Section 09 65 00 in lieu of base bid flooring.</p> <p>Work fully performed, complete and in place for the sum of: _____ Dollars and _____ Cents Per Lump Sum.</p>	\$ _____	\$ _____

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
Alt.3	1	LS	<p>Alternate #3: leave the existing floor and wall base in rooms 115, 116, 117, 117A, and 120 in lieu of replacing it.</p> <p>Work fully performed, complete and in place for the sum of: _____ Dollars and _____ Cents Per Lump Sum.</p>	\$ _____	\$ _____

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
Alt.4	1	LS	<p>Alternate #4: Omit the scope of work to provide and install the two new A/C units, condensate piping, gypsum board furrdowns, rooftop unit, roof work, electrical work, associated with supplemental A/C in room 109.</p> <p>Work fully performed, complete and in place for the sum of: _____ Dollars and _____ Cents Per Lump Sum.</p>	\$ _____	\$ _____

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	TOTAL (IN FIGURES)
Alt.5	1	LS	<p>Alternate #5: Paint the Gypsum Board wall sections on east wall of Room 106 in lieu of accent band included as base bid finish.</p> <p>Work fully performed, complete and in place for the sum of: _____ Dollars and _____ Cents Per Lump Sum.</p>	\$ _____	\$ _____

UNIT PRICES

ITEM NO.	EST. QTY.	UNIT	DESCRIPTION WITH UNIT PRICES WRITTEN IN WORDS	UNIT PRICE (IN FIGURES)	
U.P. 1	TBD	SF	<p>NOT USED</p> <p>Work fully performed, complete and in place for the sum of:</p> <p>_____ Dollars</p> <p>and _____ Cents</p> <p>Per Square Foot.</p>	\$	

All substitutions as an "OR EQUAL" must be approved in writing by the City at least three (3) business days prior to proposal opening.

It is understood that the quantities of work shown in the schedule of bid proposal items are approximate only and are subject to increase or decrease and the undersigned proposer offers to do the work at the unit price as stated in the schedule of proposal items.

PRE-BID INSPECTION

The undersigned bidder declares that he has personally inspected the **Florence Recreation Center building and site** where the work is to be performed and understands the conditions of the following:

- 1.) surface and subsurface conditions, constraints, and facilities which may in any way affect the work, in terms of cost, time, and/or construct ability;
- 2.) quantities, types, and natures of materials to be incorporated into the work;
- 3.) types and specialties of equipment, tools, labor, and superintendent required to perform the work;
- 4.) other matters which in any way will affect the work and/or the performance of the work.

TIME

It shall be the sole responsibility of the Bidder to calculate the total number of calendar days necessary to complete in full the work. Bidder's calculations to establish contract time shall include but not be limited to the following considerations:

- | | |
|--|--|
| <ul style="list-style-type: none"> A. Foul weather days B. Weekends C. Holidays D. Access conditions E. Storage conditions F. Traffic control, phasing, and sequencing G. Construction production | <ul style="list-style-type: none"> H. Coordination with utility franchises I. Potential utility conflicts with proposed work J. Reporting of utility conflicts K. Inspection coordination L. Reworking of failures M. Material delivery condition N. Subsurface soils and ground water conditions |
|--|--|

ADVISEMENT

Bidder is advised under City of Mesquite Ordinance No. 2404 that no construction activity shall occur on Sundays. Upon considering A through N of the Time section noted above, and under advisement of Ordinance No. 2404, and any and all other conditions not so named affecting the contract time, Bidder shall determine the total number of calendar days to complete in full the work. Bidder shall then submit, as a part of his bid, that total number of calendar days. If awarded the Contract, that number of days submitted shall become a part of this Contract, which the Bidder shall execute along with all other required documents. Bidder's calculation for contract time shall be included under the Bidder's bid surety.

Bidder shall include as a minimum the following number of days in the computation of contract time. The following is normal days per month with rainfall compiled by the State Climatologist, based on National Weather Service records.

January	5 days		May	5 days		September	6 days
February	5 days		June	4 days		October	4 days
March	5 days		July	4 days		November	4 days
April	5 days		August	4 days		December	5 days

The undersigned bidder agrees to commence the work on or before the date so stated in the written Notice to Proceed and to diligently perform all of the work and to substantially complete the work on or before:

Date

TERMINATION FOR DEFAULT

The City of Mesquite reserves the right to enforce the performance of this contract in any manner prescribed by **law** or deemed to be in the best interest of the City in the event of breach or default of this contract. City of Mesquite reserves the right to terminate the contract immediately in the event the successful bidder fails to:

- 1.) Meet delivery or completion schedules
- 2.) Otherwise perform in accordance with the accepted bid

Breach of contract or default authorizes the City to award to another bidder, purchase elsewhere, and charge the full increase in cost to the defaulting bidder.

LIABILITY AND INSURANCE PROVISIONS

It is agreed for all purposes hereunder, the CONTRACTOR is and shall be an independent contractor and neither he nor his employees shall, with respect to their acts or omissions, be deemed an agent or employee of CITY.

The CONTRACTOR agrees to indemnify and hold harmless and defend CITY, its officers, agents and employees, from and against liability for any and all claims, liens, suits, demands, and/or actions for damages, injuries to persons (including death), property damage (including loss of use), and expenses, including court costs and attorneys' fees and other reasonable costs arising out of or resulting from CONTRACTOR'S work and/or activities conducted in connection with or incidental to this Contract, and from any liability arising out of or resulting from the intentional acts or negligence, including all such causes of action based upon common, constitutional, or statutory law, or based in whole or in part upon the negligent or intentional acts or omissions of CONTRACTOR, including but not limited to its officers, agents, employees, subcontractors, licensees, invitees, and other persons.

CONTRACTOR further agrees that it shall at all times exercise reasonable precautions on behalf of, and be solely responsible for, the safety of its officers, agents, employees, subcontractors, licensees, invitees and other persons, as well as their property, while in the vicinity where the work is being done. It is expressly understood and agreed that CITY shall not be liable or responsible for the negligence of CONTRACTOR, including but not limited to its officers, agents, employees, subcontractors, licensees, invitees and other persons.

Further, CITY assumes no responsibility of liability for harm, injury, or any damaging events which are directly or indirectly attributable to premise defects, real or alleged, in connection with the work done by CONTRACTOR; responsibility for any and all such defects being expressly assumed by CONTRACTOR. CONTRACTOR understands and agrees that this indemnity provision shall apply to any and all claims, suits, demands, and/or actions based upon or arising from any such premise defects or conditions, including but not limited to any such claim asserted by or on behalf of CONTRACTOR, including but not limited to its officers, agents, employees, subcontractors, licensees, invitees, and other persons.

It is further agreed with respect to the above indemnity, that CITY and CONTRACTOR will provide the other prompt and timely notice on any event covered which in any way, directly or indirectly, contingent or otherwise, affects or might affect the CONTRACTOR or CITY, and CITY shall have the right to compromise and defend the same to the extent of its own interests.

In addition to the above, CONTRACTOR shall provide a Certificate of Insurance to CITY evidencing that it has secured and paid for policies of insurance covering all risks incident to or in connection with this contract in amounts and with conditions meeting all requirement of CITY as follows:

The undersigned further agrees that the unit prices quoted include all items of work required as necessary for the accomplishment of the projected work and these items include all work indicated on the Plans and Specifications for which no specific pay items have been established.

It is understood and agreed that the selection of Base or Alternate Bid Proposal(s) shall be at the complete discretion of the City and without recourse by the proposer. The right is reserved by the City as is advantageous to the City, to reject any and all bids, award a contract based upon submitted proposals, or to re-bid the contract and to waive any and all formalities. Proposer understands and agrees that the unit prices provided above shall be used for all additions and deletions from the accepted option.

Addenda: Contractor acknowledges receipt and incorporation into the bid proposal of addenda as listed below:

Addendum No. ___ dated _____	Addendum No. ___ dated _____
Addendum No. ___ dated _____	Addendum No. ___ dated _____

Contact information for checking status of project:

Contact Name: _____ Telephone: _____

Title: _____ Fax: _____

Contractor signature certifying bid proposal (required)

Firm Name Submitting Proposal

Date: _____

Print/Type Name of
Authorized Representative

Signature of
Authorized Representative

Title of Authorized Representative

SEAL (If proposer is a
Corporation)

Address

City, State, Zip

Telephone Number

email Address

PROPOSED CONSTRUCTION SCHEDULE

FLORENCE RECREATION CENTER RENOVATION

Advertising March 9 and 16, 2017

Pre-Bid Conference at Site10:00 a.m. March 21, 2017

Bid Opening..... 2:00 p.m. April 4, 2017

City Council Award Project.....April 17, 2017

Contract Notice to Proceed..... May 2, 2017

Asbestos Abatement (by separate contract)June 5 thru June 14, 2017

Premises available for construction activitiesJune 15, 2017

Construction Substantial Completion September 14, 2017

(CONSTRUCTION CALENDAR DAYS135)

Final Completion within 30 days of Substantial Completion October 15, 2017

(TOTAL CONTRACT CALENDAR DAYS165)

BID BOND

Bidders shall submit a Cashier's or Certified Check or a Bid Bond from a reliable surety company in the amount of five percent (5%) of bid. If a Bid Bond is submitted, the forms provided herein must be complete and signed by a surety licensed to do business in Texas. Bid security should be enclosed in the same envelope with the bid. Bids without the required bid security are subject to disqualification.

The required bid security shall serve as a guarantee that the successful bidder will enter into a contract and execute any additional bond and guarantee forms provided within ten (10) days after notice of award of contract. If no additional bonds are required, said bid security shall serve as a guarantee that the successful bidder will deliver all material, equipment and/or services in accordance with the bid and specifications.

Such security financially protects the City against a bidder's failure to do any of the above and is subject to forfeiture as liquidated damages if the successful bidder fails or refuses to enter into the contract for any of the following reasons: 1) The successful bidder fails to provide insurance as required in the contract documents within five (5) business days of notification that bidder is the apparent low bidder. 2) The successful bidder fails, within ten (10) calendar days from award of the bid by the Mesquite City Council, to submit properly executed performance and payment bonds as required by the Contract. If no performance and payment bonds are required, such security is subject to forfeiture as liquidated damages if the successful bidder fails or refuses to deliver all materials, equipment and /or services in accordance with the bid and specifications.

If applicable, the city shall retain the bid security submitted by the two next lowest bidders until the successful bidder executes the contract and bonds and provides all insurance as required herein. If no additional bonds are required, the bid security will be retained until delivery of all materials, equipment and / or services in accordance with the bid and specifications. If either of the next two low bidders becomes the low bidder, that bidder shall be subject to the forfeiture provisions stated above. Bid security submitted by all other bidders shall be returned as soon as practicable after the bid opening.

TERMINATION FOR DEFAULT

The City of Mesquite reserves the right to enforce the performance of this contract in any manner prescribed by law or deemed to be in the best interest of the City in the event of breach or default of this contract. City of Mesquite reserves the right to terminate the contract immediately in the event the successful bidder fails to:

- Meet delivery or completion schedules
- Otherwise perform in accordance with the accepted proposal

Breach of contract or default authorizes the City to award to another bidder, purchase elsewhere, and charge the full increase in cost to the defaulting bidder.

BID BOND

Bond No.: _____
(by Surety)

STATE OF TEXAS §
 § **KNOW ALL MEN BY THESE PRESENTS:**
COUNTY OF DALLAS §

THAT _____, of the City of _____,
_____ County, State of Texas (hereinafter referred to as "Principal"), and _____,

authorized under the laws of the State of Texas to act as Surety on bonds for principals (hereinafter referred to as "Surety") are held and firmly bound unto the City of Mesquite (hereinafter referred to as "City") in the penal sum of \$ _____ (an amount equal to 5% of the approximate total amount of the bid or if the bid is based upon alternates and/or addenda, at least 5% of the greatest amount bid by the bidder or Principal herein as evidenced in the Bid Proposal) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents;

WHEREAS the Principal has submitted on or about this date, a bid proposal offering to perform the following: **Florence Recreation Center Renovation, BID NO. 2017-044** in accordance with the specifications and terms and conditions related thereto, to which reference is hereby made;

NOW, THEREFORE, the condition of this obligation is such that if the said Principal's offer as stated in the bid proposal is accepted by the City, and the said Principal executes and returns to the City the number of original counterparts of the contract required by the City, on the forms provided by the City, for the materials, equipment and/or services described herein and also executes and returns the same number of Performance, Payment and Maintenance Bonds, if required, on the forms provided by the City, within the time provided in the specifications, then this obligation is null and void, otherwise, it is to remain in full force and effect;

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument on this _____ day of _____, 2017.

PRINCIPAL:

Typed or Printed Name
Title: _____
Company: _____
Address: _____

SURETY:

Typed or Printed Name
Title: _____
Company: _____
Address: _____

SURETY'S DALLAS COUNTY REGISTERED AGENT FOR SERVICE (REQUIRED):

Type or Printed Name

Street Address (P.O. Box is not acceptable)

City, State, and Zip Code

Dallas County Telephone No.

APPROVED AS TO FORM:

CITY OF MESQUITE

City Attorney or Designee

ATTEST:

City Secretary

SECTION GP

GENERAL PROVISIONS

(REVISED 04/19/2012)

General Provisions can be obtained through the City of Mesquite's Purchasing Office located at 1515 N. Galloway Avenue, Mesquite, Texas 75149 or by linking to the City of Mesquite's Web site www.cityofmesquite.com – Department Information – Purchasing Division. For additional information, contact the Purchasing Office at 972-216-6201.

SECTION 00490
ADDENDA

If Addenda are issued during the bid proposal process, they will be inserted into the final Contract at this location.

NOTICE

The following blank spaces in the contract are not to be filled in by the Bidder at the time of Bid submission. The contract form is submitted at this time to familiarize the Bidder with the form of contract, which the successful Bidder will be required to execute.

CONTRACT

STATE OF TEXAS §
 § **KNOW ALL MEN BY THESE PRESENTS:**
COUNTY OF DALLAS §

THIS CONTRACT is made and entered into on December 19, 2016, by and between the CITY OF MESQUITE, TEXAS, a municipal corporation, of the County of Dallas and State of Texas, acting through Cliff Keheley, City Manager, hereinafter termed the "CITY," and -----, a ----- corporation, with its principle place of business in the City of -----, ----- County, -----, hereinafter termed the "CONTRACTOR."

WITNESSETH: That for and in consideration of the mutual covenants hereinafter set forth, the CITY and CONTRACTOR agree as follows:

I. DESCRIPTION OF WORK

The CONTRACTOR shall perform all of the work as specified in the contract documents such work generally described as:

FLORENCE RECREATION CENTER RENOVATION

All work shall be performed at the CONTRACTOR's own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, bonds and other accessories and services necessary to complete the work, in accordance with the Contract documents.

II. CONTRACT DOCUMENTS

The Contract documents shall consist of the following:

1. this Contract;
2. the Scope of Work dated -----, and attached to this Contract as Exhibit B;
3. the City of Mesquite General Design Standards;
4. the Standard Specifications for Public Works Construction (North Central Texas Fourth Edition October 2004), Division 100, as amended and supplemented by the City of Mesquite by Addendum (hereinafter referred to as the "General Provisions");
5. a Performance Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract price, which Bond shall be in a form acceptable to the City, shall guarantee the work in accordance with the plans and specifications for a period of two (2) years after acceptance by the City, and shall provide for repair or replacement of all defects due to faulty material and/or workmanship that appear within a period of two (2) years from the date of acceptance by the City;
6. a Payment Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract price; and
7. the CONTRACTOR's bid/proposal, dated ----- and attached to this Contract as Exhibit A, and any other documents identified as pertaining to this Contract, all of which have been identified by the CITY and the CONTRACTOR and attached to this Contract.

These Contract documents constitute the entire agreement between the CITY and CONTRACTOR, and all are as fully a part of this Contract as if attached to or repeated herein. The Contract documents are

complementary and what is called for by one shall be as binding as if called for by all. 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. The Contract may be altered, amended or modified only as provided in the general or special provisions.

III. TIME OF COMMENCEMENT, COMPLETION

IV. AND LIQUIDATED DAMAGES

The work to be performed under this Contract shall be commenced by the CONTRACTOR upon final execution of this Contract and notice from the CITY to proceed. All work to be performed under this Contract shall be substantially completed on or before ----- **date**, subject to extensions of time provided in accordance with the Contract documents. Time is of the essence in this Contract and it is understood by the CONTRACTOR and CITY that actual damages caused by the failure of the CONTRACTOR to complete the work within the stated time are impractical or extremely difficult to fix or ascertain, and that per diem deduction from the Contract price shall be retained by the CITY as payment by the CONTRACTOR of liquidated damages, and not as penalty for such failure. Such liquidated damages to be assessed and retained are set forth in the General Provisions. Final completion including contract close-out activities shall be completed within 30 days after Substantial Completion.

V. CONTRACT PRICE

The CITY shall pay the CONTRACTOR for the performance of the work, subject to additions and deductions by change order or as otherwise provided in the provisions of this Contract, in current funds the Contract sum, which has been bid as a separated contract in compliance with the Texas Tax Code, as follows:

Total Lump Sum, payable upon Owner’s final acceptance: \$.00

VI. CONTRACT ADMINISTRATION

This Contract shall be administered on behalf of the CITY by Robert Blankenship, Parks Project Manager, (referred to herein as “City Representative”), and the CONTRACTOR shall fully comply with any and all instructions from said City Representative. With execution and delivery of the Contract, the CONTRACTOR shall furnish and file with the CITY in the amounts herein required, performance and payment bonds in accordance with the provisions of V.T.C.A. Government Code, Chapter.

**VI. DISCLOSURE OF CONFLICTS OF INTEREST
AND COMPLIANCE WITH OTHER APPLICABLE LAWS**

The CONTRACTOR shall at all times observe and comply with all Federal, State, and local laws, ordinances and regulations including all amendments and revisions thereto, which in any manner affect the CONTRACTOR or the services and/or items to be provided, specifically and not limited to any ethics laws. In particular, the CONTRACTOR is put on notice that the CITY will require the CONTRACTOR to comply with Chapter 176 of the Texas Local Government Code by completing the attached Conflict of Interest questionnaire (FORM CIQ) and returning the completed FORM CIQ to the CITY. Additionally, CONTRACTOR must comply with Section 2252.908 of the Texas Government Code, which was enacted in 2015 by the Texas Legislature pursuant to HB 1295, providing that a governmental entity may not enter into certain

contracts with a business entity on or after January 1, 2016, unless the business entity submits a disclosure of interested parties (FORM1295) to the governmental entity at the time the business entity submits the signed contract to the governmental entity. Further information regarding the disclosure of interested parties law and instructions on filing FORM1295 can be found at the Texas Ethics Commission web site at the following web address:

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

VII. INSURANCE

The CONTRACTOR agrees to provide and to maintain the types and amounts of insurance set forth in the General Provisions attached hereto, and to include the CITY as an additional insured in all policies providing coverage for the term of this Contract.

VIII. CHOICE OF LAW, VENUE, AND CONTRACT INTERPRETATION

The Parties agree that the laws of the State of Texas shall apply to this Contract, and that it is performable in Dallas County, Texas. Exclusive venue shall lie in Dallas County, Texas. Although this Contract is drafted by the CITY, should any part be in dispute, the parties agree this Contract shall not be construed more favorably for either Party.

IX. SEVERABILITY

If any part of this Contract shall be stricken for any reason whatsoever or found to be invalid or unenforceable, that part will be severed, and the remainder of this Contract will continue in full force and effect.

X. SURVIVAL

Any liabilities or obligations of a Party for acts or omissions prior to the cancellation or termination of this Contract, and any other provisions of this Contract which, by their terms, are contemplated to survive (or to be performed after) termination of this Contract, shall survive cancellation or termination thereof.

XI. AUTHORITY TO SIGN

The undersigned officers and/or agents of the parties hereto are the properly authorized officials and have the necessary authority to execute this Contract on behalf of the parties hereto.

IN WITNESS WHEREOF, the CITY and CONTRACTOR have executed this Contract in the year and day first written above.

CITY OF MESQUITE (CITY)

_____ **(CONTRACTOR)**

By: _____
Cliff Keheley
City Manager

BY: _____

ATTEST:

ATTEST:

By: _____
Sonja Land, City Secretary

By: _____
Corporate Secretary

APPROVED AS TO FORM:

By: _____
City Attorney or Designee

Acknowledgment

State of Texas, County of Dallas:

Before me the undersigned authority on this day personally appeared _____, known to be the person whose name is subscribed to the foregoing document and known to me to be the _____ (title) of Contractor's Co. (company name) and acknowledged to me that (s) he executed said document with full authority to do so and for the purposes and consideration expressed therein. Given under my hand and seal of office the

_____ day of _____

Notary Public in and for the State of Texas

APPROVED AS TO FORM:

By: _____
City Attorney or Designee

PERFORMANCE BOND

STATE OF TEXAS §
 § **KNOW ALL MEN BY THESE PRESENTS:**
COUNTY OF DALLAS §

THAT _____, of the City of _____, _____ County, State of Texas (hereinafter referred to as "Principal"), and _____ (hereinafter referred to as "Surety"), authorized under the laws of the State of Texas to act as Surety on bonds for principals are held and firmly bound unto the **City of Mesquite** (hereinafter referred to as "City") in the penal sum of \$_____ (not less than 100% of the approximate total amount of the Contract as evidenced in the Proposal) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS the Principal has entered into a certain written contract with the City, dated the _____ day of _____, 2017, for the **FLORENCE RECREATION CENTER RENOVATION, BID NO. 2017-044** 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;

NOW, THEREFORE, the 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, and according to the true intent and meaning of said Contract and the Plans and Specifications hereto annexed, then this obligation shall be void; otherwise, to remain in full force and effect.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of V.T.C.A. Government Code Chapter 2253, Public Work Performance and Payment bonds, as amended, and Article 53.201 of the Property Code, 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 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 must be approved by the Texas State Board of Insurance under Article 7.19-1 of the Insurance Code and authorized under the laws of Texas to act a surety on bonds for principals.

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 **two (2) years** from the date of completion and acceptance of the improvement by the City.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument on this the ____ day of _____, 2017.

PRINCIPAL:

Signature:

Printed Name:

Title:

Company:

Street Address:

(P.O. Box is not acceptable)

City, State, Zip Code

Phone Number:

Dallas Telephone Number

SURETY:

Signature:

Printed Name:

Title:

Company:

Street Address:

(P.O. Box is not acceptable)

City, State, Zip Code

SURETY'S DALLAS COUNTY REGISTERED AGENT FOR SERVICE (REQUIRED):

Printed Name:

Title:

Company:

Street Address:

(P.O. Box is not acceptable)

City, State, Zip Code

Phone Number:

Dallas County Telephone Number

(Attach dated Power of Attorney for Surety)

ATTEST:

City Secretary

APPROVED AS TO FORM:

City Attorney or Designee

PAYMENT BOND

STATE OF TEXAS §
 §
COUNTY OF DALLAS §

KNOW ALL MEN BY THESE PRESENTS:

THAT _____, of the City of _____, _____ County, State of Texas, (hereinafter referred to as Principal), and _____ (hereinafter referred to as "Surety"), authorized under the laws of the State of Texas to act as Surety on bonds for principals are held and firmly bound unto the City of Mesquite (hereinafter referred to as "City") in the penal sum of \$_____ (an amount not less than 100% of the approximate total amount of the Contract) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS the Principal has entered into a certain written contract with the City, dated the _____ day of _____, 2017, for the **FLORENCE RECREATION CENTER RENOVATION, BID No. 2017-044** 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;

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, then this obligation shall be void; otherwise, to remain in full force and effect.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of V.T.C.A. Government Code Chapter 2253, Public Work Performance and Payment bonds, as amended, and Article 53.201 of the Property Code, 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 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 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 must be approved by the Texas State Board of Insurance under Article 7.19-1 of the Insurance Code and authorized under the laws of Texas to act a surety on bonds for principals.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument on this the ____ day of _____, 2017.

PRINCIPAL:

SURETY:

Signature:

Signature:

Printed Name:

Printed Name:

Title: _____

Title: _____

Company: _____

Company: _____

Street Address:

Street Address:

(P.O. Box is not acceptable)

(P.O. Box is not acceptable)

City, State, Zip Code

City, State, Zip Code

Phone Number: _____

Dallas Telephone Number

SURETY'S DALLAS COUNTY REGISTERED AGENT FOR SERVICE (REQUIRED):

Printed Name: _____

Title: _____

Company: _____

Street Address: _____

(P.O. Box is not acceptable)

City, State, Zip Code

Phone Number: _____

Dallas County Telephone Number

(Attach dated Power of Attorney for Surety)

ATTEST:

City Secretary

APPROVED AS TO FORM:

City Attorney or Designee

SECTION TS

TECHNICAL SPECIFICATIONS

Drawings:

**Prepared by WRA Architects, Dallas Texas
Issued March 10, 2017 for Bid**

Refer to Sheet No. A000 - COVER SHEET

Specifications:

**Prepared by WRA Architects, Dallas Texas
Issued March 10, 2017 for Bid**

Refer to Section 00 01 10 - TABLE OF CONTENTS

TO THE VENDOR

DID YOU REMEMBER TO?:

- *Abide by the General and Special Conditions*
- *Make note of the opening date and time. All bids must be submitted by 2:00 p.m.*
Bids received after 2:00 p.m. will not be accepted.
- *Fill in the **unit** and **extended price** on your bid proposal.*
- *Fill in the **total amount**.*
- *Fill in the **alternate bid amounts**.*
- *Fill in the terms, if requested.*
- *Acknowledge receipt of all addendums.*
- *Fill in the **delivery time** or the **calendar days** (if applicable).*
- *Fill in the **company name, address and phone number**.*
- ***Sign bid proposal.***
- *Include your **Bid Bond**.*
- *Include on the front of your sealed envelope the following information:
Company name, address, bid number, opening date and time.*

Mailing Address:

City of Mesquite
P.O. Box 850137
Mesquite, TX 75185-0137

Purchasing Office
972-216-6201
972-216-6397 Fax

Physical Address:

City of Mesquite
1515 N. Galloway
Mesquite, TX 75149

If the procedures are not followed, your bid could be disqualified.

Thank you

Ryan Williams
Manager of Purchasing

**SECTION 01300
PROJECT MEETINGS**

PART 1 GENERAL

1.01 PRE-CONSTRUCTION MEETING

A pre-construction meeting will be held in the Parks and Recreation Conference Room prior to beginning of the work. It will be held at a time to be designated by the Park Planner, but no later than 10 days after the date of the Notice to Proceed. The City of Mesquite and their Representatives referred to as the "Owner" and Contractor shall be present. The following shall serve as a minimum agenda:

- tentative construction schedule
- critical work sequencing
- relation and coordination of prime contractors
- designation of responsible personnel
- processing of field decisions and change orders
- safety and first-aid procedures

1.02 PROGRESS MEETINGS

Progress meetings will be scheduled on an as-needed basis on date(s) mutually agreed upon by the Park Planner and the Contractor. Representatives of the Owner, Contractor and necessary sub-contractors shall be present. Minimum agenda would be as follows:

- review work progress
- note field observations, problems, and decisions
- revise construction schedule as indicated
- review submittal schedules, expedite as required to maintain schedule
- review changes proposed by the Owner for effect on construction schedule and effect on completion date.

END OF SECTION 01300

SECTION 01310 CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 FORMS OF SCHEDULES

- A. CPM, PERT, Plan-A-Log, Bar Chart or other approved form.
- B. Order: Chronological order of beginning of each item or work.
- C. Marking: Identify each item referenced by major specification section number.

1.02 CONTENT OF SCHEDULES

- A. Provide projected construction schedules for entire Work; revise periodically.
- B. Provide complete sequence of construction by activity,
 - 1. Shop drawings, project data and samples
 - a. Submittal dates.
 - b. Dates reviewed copies will be required.
 - 2. Decision dates for on-site product deliveries:
 - a. Products specified by allowances.
 - b. Selection of finishes.
 - 3. Product procurement and delivery dates.
 - 4. Dates for beginning and completion of each element of construction.
- C. Identify work by key tasks, separate phases or other logically grouped activity.
- D. Show projected percentage of completion for each item of work as of first day of each month.
- E. Provide separate sub-schedule showing submittals, review times, procurement schedules and delivery dates as required.
- F. Provide sub-schedules to define critical portions of entire schedule as required.

1.03 UPDATING

- A. Show all changes occurring since previous submission of updated schedule.
- B. Indicate progress of each activity, show completion dates.
- C. Include:
 - 1. Major changes in scope.
 - 2. Activities modified since previous updating.
 - 3. Revised projections due to changes.
 - 4. Other identifiable changes.

1.04 SUBMITTALS

- A. Submit initial schedules within 15 days after Notice to Proceed. Review of pay applications will be held until initial schedules or updated schedules are submitted.
 - 1. Park Planner will review schedules and return review copy within 10 days after receipt.
 - 2. If required, re-submit within seven (7) days after return of review copy.
- B. Submit periodically updated schedules accurately depicting progress to first day of each month.
- C. Submit the number of copies required by contract, plus two copies to be retained by the Park Planner.

1.05 DISTRIBUTION

- A. Distribute copies of reviewed schedules to:
 - 1. Job site file.
 - 2. Major sub-contractors.
 - 3. Other concerned parties.

Instruct recipients to report any inability to comply, and provide detailed explanation, with suggested remedies.

END OF SECTION 01310

SECTION 01340
MANUFACTURER'S DRAWINGS AND PRODUCT DATA

PART 1 GENERAL

1.01 MANUFACTURER'S DRAWINGS

- A. Manufacturer's 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 a portion of the Work.
- B. Identify details by referencing to sheet and detail numbers shown on Contract Drawings.
- C. Submittal: Shall be submitted electronically (email), in PDF format.

1.02 SUBMITTALS

- A. Product Data are illustrations, standard schedules, assembly drawings, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for the Work.
- B. Clearly mark each copy to identify pertinent materials, products or models.
- C. Show dimensions and clearances required.
- D. Show performance characteristics and capacities.
- E. Show manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information that is not applicable to project.
 - 2. Supplement standard information to provide additional information applicable to project.

1.03 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the City of Mesquite or any separate contractor, all Manufacturer's Drawings, Product Data and Samples required by the Specifications .
- B. By approving and submitting Manufacturer's Drawings, Product Data, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Specifications.
- C. Notify the Park Planner in writing, at time of submission, of deviations in submittals from requirements in the Specifications.
- D. The Contractor shall not be relieved of responsibility for any deviations from the requirements of the Specifications by the

Park Planner's review of Manufacturer's Drawings, Product Data unless the Contractor has specifically informed the Park Planner of such deviation at the time of submission and the Park Planner has given written approval to the specific deviation. The Park Planner's action on the stamp does not constitute acceptance of the deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Manufacturer's Drawings, Product Data by the Park Planners review thereof.

- E. If items or methods submitted deviate from the Specifications and are approved by the Park Planner or his Consultants, it shall be assumed that the approval of the accepted deviations does not alter the original contract price.
- F. The Contractor shall direct specific attention in writing or on resubmitted Manufacturer's Drawings, Product Data, to revisions other than those requested by the Park Planner on previous submittals.
- G. The Contractor may commence any portion of the work before submission of Manufacturer's Drawings, Product Data; however, he is encouraged to submit the before-mentioned items to the Park Planner for review before such commencement.
- H. Coordinate each submittal with requirements of the Work and the Specifications.
- I. It is the Contractor's responsibility to submit revised details when the dimensions and configuration of original details (Specifications) are altered by substitutions of materials.
- J. After the Park Planner's final review, distribute copies.

1.04 SUBMISSION REQUIREMENTS

- A. The initial submittal of shop drawings to the Park Planner for review shall consist of one copy in PDF format, submitted electronically (email).
- B. Accompany submittal with transmittal letter containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Number of each Manufacturer's Drawing, Product Data and Sample submitted.
 - 4. Notification of deviations from Specifications.
 - 5. Other pertinent data.
- C. Submittals shall include:
 - 1. Date and revision dates.
 - 2. Project title and number.
 - 3. The names of Park Planner, Architect, Contractor, Subcontractor, Supplier, Manufacturer, Separate detailer when pertinent.
 - 4. Identification of product or material.
 - 5. Relation to adjacent structure or materials.
 - 6. Field dimensions, clearly identified as such.
 - 7. Specification section number.

8. Applicable standards, such as ASTM number of Federal Specifications. A blank space, 4" x 5", for the Park Planner's stamp.
9. Identification of deviations from Specifications.
10. Contractor's stamp initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Specifications.

1.05 RESUBMISSION REQUIREMENTS

- A. Manufacturer's Drawings: Revise initial drawings as required and resubmit until the action on the stamp taken by the Park Planner indicated "REVIEWED" and "DO NOT RESUBMIT" or "REVIEWED AND NOTED" and "DO NOT RESUBMIT."
- B. Indicate on the drawings any changes that have been made other than those requested by the Park Planner or his Consultants.
- C. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.06 PARK PLANNER'S DUTIES

- A. Review submittals with reasonable promptness.
- B. The Park Planner's review is for the sole purpose of aiding the Contractor's efforts in providing the City of Mesquite a project consistent with the Specifications. The Park Planner is not responsible for correctness of dimensions, quantities, details, application or fabrication of any part of the Work and for any deviations from the Specifications.
- C. The Park Planner's action on the stamp does not constitute acceptance of any deviations.
- D. Review of separate items does not constitute acceptance of any deviations.
- E. Review of separate items does not constitute review of an assembly in which item functions Affix stamp and initials or signature certifying to review of submittal.
- F. Return submittals to Contractor for distribution.

END OF SECTION 01340

SECTION 01400 QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Concrete testing will only be required for new sidewalks poured and concrete floor patched.
- B. Perform all work required to furnish the Quality Control specified herein and indicated by the Contract Documents.
- C. Applicable requirements of the following parts of this Project Manual apply to all work under this section.
 1. Conditions of the Contract.
 2. General Requirements.
- D. An Independent Testing Laboratory, employed and paid for by the Contractor will perform the professional testing and laboratory services. The Owner shall approve the Testing Laboratory proposed by the Contractor.
- E. Materials and workmanship not meeting the required standards or performance obligations are to be removed and replaced at the Contractor's expense, including all subsequent testing.
- F. Make all inspections and perform all tests in accordance with the rules and regulations of the building code, Local Authorities, the specifications of the ASTM and other respective technical societies, organizations or bodies having relation to the work or materials inspected or tested.
- G. Where the terms "Inspector" and "Testing Laboratory" are used, they mean and refer respectively to an officially designated and accredited inspector of the testing laboratory and the testing laboratory engaged by the Contractor.
- H. Any testing, inspection and certifications specified in other sections of these Specifications shall be paid by the Contractor.
- I. Inspection by the Laboratory shall not relieve the Contractor or fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.

1.02 WORK INCLUDED

Owner will schedule the scope of testing by the testing laboratory. The Owner will notify the Contractor as to which tests will be performed. The Owner may require any of the following tests:

- A. Perform tests on earthwork and soil stabilization
- B. Making slump tests of all concrete.
- C. Preparing test cylinders for all concrete, including piers and sidewalks.

- D. Compression testing of all specimen cylinders taken from all concrete actually placed throughout the work.
- E. Keeping inspecting and testing logs of all inspections and tests of concrete.
- F. Submitting to Contractor, and Owner certifications, records and reports of all inspections and tests.

1.03 RESPONSIBILITY OF CONTRACTOR

- A. Deliver to the Laboratory, without cost to Owner, adequate quantities of representative samples of materials proposed for use that is required to be tested.
- B. Advise Laboratory and Parks Department sufficiently in advance of construction operations to allow Laboratory to complete any required check tests and assign personnel for field inspection and testing as specified.
- C. Provide adequate facilities for safe storage and proper curing of concrete test samples on project site for the first 24 hours and also for subsequent field curing as required by ASTM Specifications C 31.
- D. Furnish such nominal labor as is required to assist Laboratory personnel in obtaining and handling samples at the site.
- E. Furnish Concrete Mix Designs approved by the Parks Department and paid for by the Contractor.
- F. Contractor shall be responsible for payment of testing services required as described in this document.

1.04 AUTHORITY AND DUTIES OF LABORATORY PERSONNEL

- A. Laboratory personnel shall inspect and test materials, assemblies, specimens, and Work performed including design mixes, methods and techniques as specified and report to the City the progress thereof.
- B. If the material furnished and Work performed fails to meet requirements of Contract Documents, inspector shall promptly notify both the Contractor and the Parks Department of such failure.
- C. Laboratory technicians do not act as Foremen, or perform other duties for Contractor. Work will be checked as it progresses, but failure to detect any defective Work or materials shall not, in any way, prevent later rejection when such defect is discovered.
- D. The inspector is not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, or to approve or accept any portion of the Work.

1.05 SUBMITTALS

- A. Before leaving the construction site the Inspector shall deliver to the Contractor a written copy of his report.
- B. Submit two (2) copies each to the Contractor and to the Parks Department of reports of each and every inspection and test required to be made as part of the Work of this Section, or ordered by the Parks Department or the Contractor to be made either in addition to or supplementary to inspecting and testing specified herein or in other Sections of the Specifications.
- C. State in report all details of each inspection and test to indicate satisfactory compliance with requirements of the Contract Documents. Also state in report any and all unsatisfactory conditions or failure to comply with the requirements of the Contract Documents.
- D. At completion of each trade or branch of Work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of Work inspected and full compliance with requirements for all Work and materials tested.

PART 2 - PRODUCTS - N/A

PART 3 - EXECUTION

3.01 TESTING OF CONCRETE:

- A. The Testing Laboratory shall perform the following tests:
 - 1. Concrete Mix design.
 - 2. Concrete compressive strength on cylinders at seven (7) and twenty-eight (28) days.
 - 3. Concrete slump determination.
- B. All inspection, cylinder(s) required and testing shall be in accordance with testing specified for concrete.

3.02 DESIGN OF CONCRETE MIXES:

- A. Refer to Section 02515 - Cast in Place Concrete (Sidewalks).
- B. Design of Concrete Mixes:
 - 1. Contractor shall be responsible for payment for design of all concrete mixes.
 - 2. Mix designs shall be checked and revised, if necessary, wherever changes are made in aggregates or in surface water contact or aggregate or workability of the concrete. Slump will be the minimum to produce a workable mix. Laboratory will prescribe maximum quantity of water to be used for each class of concrete.

3.03 CONTROLS AND TESTING OF CONCRETE:

- A. During the progress of mixing and placing concrete on job, take specimens and provide molds as specified. Transport, cure and store cylinders in accordance with the Standard Method for Making and Curing Concrete Compression and Flexure Test Specimens in the Field, ASTM Specifications C-31-66. Perform compression test of

one specimen after seven (7) days and two after twenty-eight (28) days.

- B. Conduct compression tests of concrete in accordance with ASTM Specifications, Designation C-39-66.
- C. Test Cylinders: During progress of work, test cylinders shall be made and tested for each different mix placed in any one day. For every concrete placement of 50 cubic yards or part thereof over 10 cubic yards, four compression test cylinders will be made by Testing Laboratory of samples taken during pour. Make test cylinders in accordance with ASTM Designation C-31-66 and test in accordance with ASTM Designation C-29-66; one at seven (7) days and two at twenty-eight (28) days for normal cement; and retained in reserve for later testing, if required. Make additional sets of four cylinders for concrete placements from 50 yards to 100 yards and a third set for pours exceeding 150 yards.
- D. Slump Tests:
 - 1. Make slump tests for each 50 cubic yards of concrete placed by Contractor, and for each set of cylinders in accordance with ASTM Designation C-143-66.
 - 2. Slump shall conform to limits shown on Drawings.
- E. Job site inspection of each batch of concrete, adjusting amounts of mixing alter to assure uniform consistency from truck to truck.
- F. Check mixing time of concrete in trucks.
- G. Laboratory technicians shall inspect materials and manufacture of concrete, and report findings. When it appears that material furnished or work performed by Contractor fails to fulfill Specification requirements, technicians shall direct attention of Owner and Contractor to such failure.
- H. Not Used.
- I. Laboratory technicians do not act as foreman or perform other duties for the Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered. Laboratory technicians are not authorized to revoke, alter, relax, enlarge, or release any requirement of the Specifications, no to approve or accept any portion or work.
- J. Test reports shall show the time the test was made, truck ticket number, slump and time of batching and location of each placement.
- K. When strength of test cylinders falls below design strength and Owner requires drilling of concrete core specimens, test core specimens in accordance with ASTM Specifications, Designation C-42-64.
- L. Report promptly to Owner all details of reasons for rejection of any and all quantities of concrete. Give all information

concerning locations of the concrete pours, quantities, date of pours and other pertinent facts concerning concrete represented by the specimens.

END OF SECTION 01400

**SECTION 01700
PROJECT CLOSEOUT**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

The general provisions of the Contract, including General Conditions and Division 1 - General Requirements, apply to the work specified in this section.

1.02 DESCRIPTION OF REQUIREMENTS

Definitions: Closeout is hereby defined to include the general requirements near the end of the Contract Time, in preparation for final acceptance, final payment, normal termination of the Contract, occupancy by the City of Mesquite and similar actions evidencing completion of the work. The time of closeout is recognized as being directly related to "Substantial Completion," and therefore is a single time period for the entire work.

1.03 PREREQUISITES FOR SUBSTANTIAL COMPLETION

- A. Prior to requesting Park Planner's inspection for certification of substantial completion, as required by the General Conditions (for either the entire work or portions thereof), complete the following and list known exceptions in request:
- B. Submit last progress payment request, showing either 100 percent completion of the work, or list incomplete items and value of incompleteness.
- C. Advise City of Mesquite of pending insurance changeover requirements.
- D. Submit warranty of work certificate, and other guarantees for work as may be required.
- E. Submit record drawings, maintenance manuals and similar final record information.
- F. Deliver tools, spare parts, extra stocks of materials and similar physical items to the City of Mesquite.
- G. Complete startup testing of systems, and instructions of City of Mesquite's operating/maintenance personnel.
- H. Discontinue (or change over) and remove from the project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.
- I. Complete the final cleaning.
- J. Comply with governing regulations for local registration and posting of notice.

1.04 PREREQUISITES FOR FINAL ACCEPTANCE

- A. Prior to requesting Park Planner's final inspection and final payment, as required by the General Conditions, complete the following and list known exceptions (if any) in request.
- B. Submit final payment request with final releases and supports not previously submitted and accepted. In addition, include certificates of insurance and warranty documentation for all products and completed operations.
- C. Submit certified copy of Park Planner's final punch list of itemized work to be completed or corrected, stating that each has been completed or otherwise resolved for acceptance, endorsed and dated by the Park Planner.

1.05 RECORD DOCUMENT SUBMITTALS

- A. General: Specific requirements for record documents are indicated in individual sections of these specifications.
- B. Record Drawings or "As-Built Drawings:" Contract drawings and shop drawings shall be marked up showing actual installations, which vary from the work as originally shown. Markup new information that is recognized to be of importance to the City of Mesquite but was for some reason not shown on either the contract drawings or shop drawings. Give particular attention to concealed or underground work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize record drawings sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set. Submit sepias and two sets of blue or black line prints to the Park Planner.

PART 2 PRODUCTS - N/A

PART 3 EXECUTION

3.01 CLOSEOUT PROCEDURES

General Operating/Maintenance Instructions: Arrange for each installer of work requiring continuing maintenance (by the City of Mesquite) to meet with the City of Mesquite's personnel, at the project site, to provide basic instructions needed for proper maintenance of the entire work. Include instructions needed for proper maintenance of the entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance in relation with applicable guarantees, agreements to maintain, bonds and similar continuing commitments.

3.02 FINAL CLEANING

A. General:

1. Clean and rake paving surface to a stain and debris-free condition, free of all litter and foreign objects, stains, films and similar noticeable distracting substances. Except as otherwise indicated; avoid disturbing the natural exterior surface. Restore all paved surfaces to original condition, as required.
2. Clean project construction site of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains; petrochemical spills and other foreign deposits.
3. Clean interior floors, walls, equipment, and fixtures. Wax appropriate resilient floors.

B. Time of Final Cleaning: Prior to Park Planner's inspection for "Substantial Completion" certification.

C. Removal of Protection: Except as otherwise indicated or requested by the Park Planner, remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work during the remainder of the construction period.

D. Compliance: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site, or bury debris of excess materials on the City of Mesquite's property, or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01700

SECTION 01710 CLEANING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

Cleaning up required for specific trades or work is specified in section pertaining to that trade or work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:

- A. Fire Protection: Store volatile waste in covered metal containers and remove from premises daily.
- B. Pollution Control: Conduct clean up and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Burning or burying of rubbish and waste materials on the project site is not permitted.
 - 2. Disposal of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - MATERIALS

2.01 CLEANING MATERIALS:

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION:

- A. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
- B. Sprinkle dusty debris with water.
- C. Clean up site and access and dispose of waste materials, rubbish, and debris every workday during progress of work.
- D. Contractor must arrange with City of Mesquite contracted waste haulers for any roll-off containers used on site.
- E. Provide dump containers and locate with approval from the Park Planner, on site for collection of waste materials, rubbish and debris.
- F. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.

- G. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas.
- H. Lower waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- I. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING:

- A. At completion of construction and just prior to acceptance or occupancy, conduct a final inspection of exterior surfaces.
- B. Remove debris, grease, dirt, stains and other foreign materials, from exterior surfaces.
- C. Repair, patch and touch up marred surfaces to match adjacent finishes.
- D. Broom clean paved surfaces; rake clean other surfaces of grounds.
- E. The Owner will clean all the exterior existing windows, inside and outside, both at ground level.
- F. All glazing installed by contractor and all other existing interior glazing shall be cleaned by this contractor.

END OF SECTION 01710

**SECTION 01 10 00
SUMMARY**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Florence Recreation Center Renovation.
- B. Owner's Name: City of Mesquite.
- C. Architect's Name: WRA Architects, Inc.
- D. The Project consists of the selective renovation of the existing Florence Recreation Center, consisting of removal and replacement of flooring and wall base, toilet partitions and associated toilet accessories, doors, windows, casework painting and MEP specific items. New work includes doors and glazing system. Scope also includes some AC split system work and associated ductwork and controls.

1.02 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of selective demolition and removal work is shown on drawings and specified in Section 02 41 00.
- B. Owner will remove the following items before start of work:
 - 1. Loose furniture and equipment.

1.03 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:
 - 1. Movable cabinets.
 - 2. Furnishings.
 - 3. Small equipment.
 - 4. Rugs.
 - 5. Artwork.

1.04 OWNER OCCUPANCY

- A. Owner intends to vacate only the Recreation Center Building and the adjacent park areas will still be used during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's maintenance operations.
- D. Schedule the Work to accommodate Owner occupancy at substantial completion.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings and as directed by the Owner.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Others.
 - 3. Work by Owner.
 - 4. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.

- D. Existing building spaces may not be used for storage.
- E. Time Restrictions:
 - 1. Limit conduct of especially noisy exterior work to and in accordance with restrictions identified in the ordinances of the municipality having jurisdiction.
- F. Utility Outages and Shutdown:
 - 1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 - 2. Prevent accidental disruption of utility services to other facilities.

1.06 WORK SEQUENCE

- A. Coordinate construction schedule and operations with General Contractor.
- B. Construct and maintain throughout the period of construction a safe means of emergency egress out of existing building exits through the construction site. The means and methods of maintaining the temporary emergency egress shall be the responsibility of the General Contractor.
 - 1. Coordinate with the Owner on scheduled fire and emergency drills. Develop an egress plan and submit for approval to the Owner and the Architect prior to the first scheduled fire or emergency drill.

1.07 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Unless otherwise noted, all provisions of the sections listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.
- B. Section 01300 - Project Meetings.
- C. Section 01310 - Construction Schedules.
- D. Section 01340 - Manufacturer's Drawings and Product Data.
- E. Section 01400 - Quality Control.
- F. Section 01700 - Project Closeout.
- G. Section 01710 - Cleaning.
- H. Section 01 42 13 - Abbreviations and Acronyms.
- I. Section 01 50 00 - Temporary Facilities and Controls.
- J. Section 01 60 00 - Product Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 - GENERAL

1.01 SCOPE

A. Various abbreviations and symbols used in the drawings and specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 42 19 - Reference Standards.

1.03 QUALITY ASSURANCE

A. In case of conflict between abbreviations, or between abbreviations and symbols, most stringent requirement shall govern.

B. Submit conflicts to Architect for clarification.

PART 2 - PRODUCTS

2.01 SCHEDULE OF ABBREVIATIONS AND SYMBOLS

ABV	Above
AFF	Above finish floor
ACOUST	Acoustical
ADD	Addendum
ADH	Adhesive
ADJC	Adjacent
ADJ	Adjustable
AGG	Aggregate
A/C	Air Conditioning
AHU	Air Handling Unit
ALT	Alternate
ALUM	Aluminum
ANOD	Anodized
APPROX	Approximate
ARCH	Architect / Architectural
ASPH	Asphalt
AUD	Auditorium
BSMT	Basement
BM	Beam
BRG	Bearing
BEL	Below
BFF	Below finish floor
BM	Bench Mark
BET	Between
BIT	Bituminous
BLK	Block
BLKG	Blocking

Florence Recreation Center Renovation

BD	Board
BW	Both Ways
BOT	Bottom
BRK	Brick
BLDG	Building
BUR	Built-up Roof
BBD	Bulletin Board
CAB	Cabinet
CAD	Cadmium
CPT	Carpet (ed)
CS	Carpet strip
CI	Cast Iron
CLG	Ceiling
CHT	Ceiling Height
CEM	Cement
CER	Ceramic
CT	Ceramic tile
CM-TILE	Ceramic mosaic tile
CHBD	Chalkboard
CIR	Circle
CLR	Clear dimension
CLST	Closet
CFMF	Cold Formed Metal Framing
CR	Cold rolled
COL	Column
COMP	Compress (ed) (ion) (ible)
CONC	Concrete
CMU	Concrete Masonry Unit
CONST	Construction
CONT	Continuous
CJ	Control Joint
CORR	Corridor
CFL	Counterflashing
CRS	Course(s)
CFT	Cubic Foot
CY	Cubic Yard
DMPF	Dampproofing
DEM	Demolish / Demolition
DEPT	Department
D	Depth

DIA	Diameter
DIM	Dimension
DR	Door
DWL	Dowels
DN	Down
DS	Downspout
DWR	Drawer
DWG	Drawing
DF	Drinking Fountain
EA	Each
E	East
ELEC	Electrical
EWC	Electric Water Cooler
ELEV	Elevation / Elevator
EOD	Emergency overflow drain
EOS	Emergency overflow scupper
EPO	Emergency Power Off
EQ	Equal
EQUIP	Equipment
EST	Estimate
EXH	Exhaust
EXIST	Existing
EJ	Expansion Joint
EXP	Exposed
EXT	Exterior
EIFS	Exterior Insulation and Finish System
FB	Face Brick
FO	Face of
FOF	Face of Finish
FOM	Face of Masonry
FOS	Face of Studs
FV	Field Verify
FIN	Finish (ed)
FIN FL	Finish Floor
FE	Fire Extinguisher
FEB	Fire Extinguisher Bracket
FEC	Fire Extinguisher Cabinet
FECR	Fire Extinguisher Cabinet, Rated
FHC	Fire Hose Cabinet
FVC	Fire Valve Cabinet

Florence Recreation Center Renovation

FLG	Flashing
FLX	Flexible
FL	Floor
FD	Floor Drain
FLUOR	Fluorescent
FS	Federal Specification
FT	Foot / Feet
FTG	Footing
FR	Frame
FUT	Future
FUR	Furring
FURR-DN	Furrdown
GYP BD	Gypsum Board
GVL	Gravel
GB	Grab Bar
GL	Glass / Glazing
GALV	Galvanized
GA	Gage / Gauge
HC	Handicapped
HDW	Hardware
HDWD	Hardwood
HTG	Heating
HVAC	Heating/Ventilation/AC
H	Height
HT	Height
HM	Hollow Metal
HORIZ	Horizontal
HB	Hose Bibb
HWH	Hot Water Heater
HR	Hour
INCAND	Incandescent
IN	Inch
INCL	Include (d) (ing)
INSTRU	Instruments
INSUL	Insulation
INT	Interior
INTM	Intermediate
INV	Invert

JAN	Janitor
JT	Joint
JF	Joint Filler
JST	Joist
KPL	Kickplate
KIT	Kitchen
LAB	Laboratory
LAD	Ladder
LAM	Laminated / Laminate
LAV	Lavatory
LICLG	Lay-in ceiling
LH	Left Hand
L	Length
LT	Light
LTWT	Light weight
LOC	Location
LVR	Louver
LPT	Low Point
MFD	Manufactured
MFG	Manufacturing
MFR	Manufacturer
MH	Manhole
MAS	Masonry
MO	Masonry Opening
MATL	Material
MAX	Maximum
MECH	Mechanical
MED	Medium
MEMB	Membrane
MTL	Metal
MIL	Thousandth inch
MIN	Minimum
MIR	Mirror
MISC	Miscellaneous
MT	Mount (ed) (ing)
MULL	Mullion
NL	Nailable
NAT	Natural

Florence Recreation Center Renovation

NRC	Noise Reduction Coefficient
NOM	Nominal dimension
N	North
NIC	Not in Contract
NTS	Not to Scale
NO	Number
OBS	Obscure
O.C.	On Center
O.C.E.W.	On Center Each Way
OPNG	Opening
OPP	Opposite
OPP.HAND	Opposite hand
OA	Overall
OH	Overhead
PTD	Painted
PR	Pair
PNL	Panel
PAR	Parallel
PKG	Parking
PART'N	Partition
PVMT	Pavement
PERIM	Perimeter
PLAS	Plaster
PLAS.LAM	Plastic Laminate
P. LAM	Plastic Laminate
PL	Plate
PLUMB	Plumbing
PLBG	Plumbing
PLYWD	Plywood
PVC	Polyvinyl Chloride
PCF	Pound per Cubic Foot
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PROJ	Projection
PROP	Property
Q-TILE	Quarry tile
R	Radius, riser
REF	Reference

REFL	Reflected
REFR	Refrigerator
REG	Register
RCP	Reinforced Concrete Pipe
REINF	Reinforc (ing) (ed)
REM	Remove
REQ'D	Required
RET	Return
R/A	Return Air
REV	Revision / Revised
ROW	Right of Way
RD	Roof Drain
RFH	Roof Hatch
RM	Room
RO	Rough Opening
SCHED	Schedule
SNT	Sealant
SECT	Section
SHTH	Sheathing
SHT	Sheet
SIM	Similar
SKL	Skylight
SL	Sleeve
SC	Solid Core
SCWD	Solid Core Wood Door
S	South
SPK	Speaker
SPCL	Special
SPEC	Specification
SPKLR	Sprinkler
SQ	Square
SS	Stainless Steel
STD	Standard
STL	Steel
STOR	Storage
STRUC	Structure, structural
SUSP	Suspended
SYM	Symmetr (y) (ical)
SYST	System
TKBD	Tackboard

Florence Recreation Center Renovation

TKS	Tackstrip
TEL	Telephone
TV	Television Outlet
TEMP	Temporary
TEMP.GL	Tempered Glass
TERR	Terrazzo
THK	Thick (ness)
THRESH	Threshold
TA	Toilet Accessories
TOL	Tolerance
T & G	Tongue and Groove
T.O.B.	Top of Beam
TC	Top of Curb
T.O.J.	Top of Joist
T.O.SL.	Top of Slab
T.O.S.	Top of Steel
TB	Towel Bar
T	Tread
TYP	Typical
UL	Underwriter's Laboratories
UNO	Unless noted otherwise
UR	Urinal
VB	Vapor Barrier
VNR	Veneer
VIF	Verify in Field
VERT	Vertical
VIN	Vinyl
VCT	Vinyl Composition Tile
VWC	Vinyl Wall Covering
WH	Wall Hung
WC	Water Closet
WP	Waterproofing
WWF	Welded Wire Fabric
W	West
W	Width
W/	With
W/O	Without
WG	Wire Glass
WD	Wood

WPT

Working Point

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers and enclosures.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

1.02 TEMPORARY UTILITIES

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, ventilation, and gas required for construction purposes during the construction period from June 15, 2017 to August 14, 2017.
- B. Owner and Contractor shall jointly read the meters on utilities and record. Contractor shall reimburse Owner for prorated usage during construction period.
- C. Existing facilities may be used.
- D. New permanent facilities may be used.
- E. Use trigger-operated nozzles for water hoses, to avoid waste of water.
- F. ELECTRICAL SERVICE, LIGHTING
 - 1. Provide service required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
 - 2. Provide lighting for construction operations.
 - 3. Permanent lighting may be used during construction. Maintain lighting and make routine repairs.
- G. AC, HEAT, VENTILATION
 - 1. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.
 - 2. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.
 - 3. Provide temporary weather-tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.
- H. WATER
 - 1. Water required in the performance of the contract shall be provided and paid for by the General Contractor. Water used for human consumption shall conform to requirements of State and Local Authorities for potable water.
 - 2. Furnish and install all branch lines and service pipings and fittings to supply temporary water in sufficient quantity at required locations of the building and shall bear costs of making the service connections at approved locations. Temporary connections and piping shall be removed and all openings closed at end of the work.
- I. TEMPORARY FIRE PROTECTION

1. Observe and enforce, throughout the work, during the whole period of construction, all requirements of City, State and Insurance authorities to minimize fire hazards during the progress of the Work.
2. Combustible refuse shall be removed from within the building daily.
3. Provide fire extinguishers as required by the local fire department and city ordinances.

1.03 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services at time of project mobilization and during construction.
- B. Telecommunications services shall include:
 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 2. Internet Connections: Minimum of one; DSL modem or faster.
 3. Email or Facsimile Service: Fax-to-email software on personal computer.
- C. Provide, maintain and pay for email or facsimile service at time of project mobilization and during construction.

1.04 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- B. Keep existing building weather-tight at all times during all phases of construction.

1.07 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings to separate work areas from adjacent school building, to prevent penetration of dust and moisture into school occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.08 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.09 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.

- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated parking area may be used for construction traffic and parking.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.10 WATER CONTROL

- A. Maintain excavations free of water. Provide and operate pumping equipment.

1.11 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
- C. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

1.13 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on Drawings.
- B. Erect on site at location established by Architect.
- C. No other signs are allowed without Owner permission except those required by law.

1.14 FIELD OFFICES

- A. May be located in existing facility.
- B. Provide space for Project meetings, with table and chairs to accommodate 10 persons.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Substitution limitations and procedures.
- D. Procedures for Owner-supplied products.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. DO NOT USE products having any of the following characteristics:
 - 1. Made outside the United States, its territories, Canada, or Mexico.
 - 2. Made using or containing CFC's or HCFC's.
- C. Where all other criteria are met, General Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined in Section 01 61 16.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
 - 3. Have a published GreenScreen Chemical Hazard Analysis.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.
- C. Maintain spare products in original containers with labels intact and legible, until delivery to Owner.
- D. Coordinate with Owner: Deliver and unload spare products to Owner at Project site and obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Requests for substitutions of products will be considered only if submitted at least ten (10) days prior to bid date. Subsequent requests will be considered only in case of product unavailability or other conditions beyond control of Contractor.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. Request for Substitution: (CSI form preferred, however any similar format is acceptable.)
 - 1. Submit separate request for each substitution. Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.
 - 2. Identify product by Specifications section and Article numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.
 - 3. Attach product data as specified in Section 01 30 00.
 - 4. List similar projects using product, dates of installation, and names of Architect and Owner.
 - 5. Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specifications section and Article numbers.
 - 6. Give quality and performance comparison between proposed substitution and the specified product.
 - 7. List availability of maintenance services and replacement materials.
 - 8. State effect of substitution on construction schedule, and changes required in other work or products.
- D. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Contractor certifies that cost data presented is complete and includes all related costs under this Contract.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitute products shall not be ordered or installed without written acceptance.
- G. Only one request for substitution for each product will be considered. When substitution is not accepted, provide specified product.
- H. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. Architect will reply in the form of written addenda if any of the substitutions are accepted for use in this project.

3.02 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to General Contractor.
 - 2. Arrange and pay for product delivery to site.

3. On delivery, inspect products jointly with General Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- B. General Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Require supplier to package products in boxes or crates for protection during shipment, handling, and storage. Protect sensitive products against exposure to elements and moisture.
- D. Protect sensitive equipment and finishes against impact, abrasion, and other damage.
- E. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- F. Transport and handle products in accordance with manufacturer's instructions.
- G. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- H. Deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.
- I. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- J. Clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.
- K. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Arrange storage in a manner to provide access for maintenance of stored items and for inspection.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
 1. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
 2. Provide humidity control and ventilation for sensitive products as required by manufacturer's instructions.
 3. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
- F. For exterior storage of fabricated products, place on sloped supports above ground.

- G. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide surface drainage to prevent erosion and ponding of water.
- N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- P. Maintenance of Storage
 - 1. Periodically inspect stored products on a scheduled basis.
 - 2. Verify that storage facilities comply with manufacturer's product storage requirements.
 - 3. Verify that manufacturer required environmental conditions are maintained continually.
 - 4. Verify that surfaces of products exposed to the elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.
- Q. Maintenance of Equipment Storage
 - 1. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions shown on exterior of package.
 - 2. Service equipment on a regularly scheduled basis, maintaining a log of services; submit as a record document.

END OF SECTION

SECTION 01 61 16

VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.
- C. Requirement for installer certification that they did not use any non-compliant products.
- D. VOC restrictions for product categories listed below under "DEFINITIONS."
- E. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.02 RELATED REQUIREMENTS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings.
 - 2. Interior adhesives and sealants, including flooring adhesives.
 - 3. Flooring.
 - 4. Composite wood.
 - 5. Products making up wall and ceiling assemblies.
 - 6. Thermal and acoustical insulation.
 - 7. Other products when specifically stated in the specifications.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings.
 - 2. Interior adhesives and sealants, including flooring adhesives.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Concrete.
 - 2. Clay brick.
 - 3. Metals that are plated, anodized, or powder-coated.
 - 4. Glass.
 - 5. Ceramics.
 - 6. Solid wood flooring that is unfinished and untreated.

1.04 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

- C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.

1.05 QUALITY ASSURANCE

- A. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 - 1. Adhesives, Including Flooring Adhesives: SCAQMD Rule 1168.
 - 2. Joint Sealants: SCAQMD Rule 1168.
 - 3. Paints and Coatings: Each color; most stringent of the following:
 - a. 40 CFR 59, Subpart D.
 - b. SCAQMD Rule 1113.
 - c. CARB (SCM).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by General Contractor.

END OF SECTION

**SECTION 02515
CAST IN PLACE CONCRETE (SIDEWALKS)**

PART 1 GENERAL

1.01 GENERAL

Provide concrete sidewalks required for Unit Cost work only. If required, the concrete work includes:

- A. Final sub-grade preparation.
- B. Paved sidewalks at the locations as determined by the Owner and Architect.

1.02 QUALITY ASSURANCE

- A. Comply with Section 01400 requirements.
- B. Materials and methods of construction shall comply with the following standards:
 - 1. American Society for Testing and Materials, (ASTM).
 - 2. American Concrete Institute, (ACI).
 - 3. Maintain field records of time, date of placing, curing and removal of forms of concrete in each portion of work.
- C. Do not change source or brands of cement and aggregate materials during the course of the work.
- D. Construct sidewalks subject to the standard specifications for Public Works Construction for North Central Texas requirements, in accordance with such requirements.

1.03 SUBMITTALS

Contractor shall submit concrete delivery tickets to Park Planner the day of the pour. Show the following:

- A. Batch number
- B. Mix by class or sack content with maximum size aggregate.
- C. Admixtures
- D. Air content
- E. Slump
- F. Time of loading

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver curing materials, admixtures and retarders in manufacturer's standard unopened containers with labels legible and intact. Store and protect from freezing and damage.
- B. Cleaning of concrete delivery vehicles is forbidden on project site.

1.05 PROJECT CONDITIONS

- A. Work notification: Notify Park Planner at least 24 hours prior to installation of concrete.
- B. Formwork and steel rebar placement shall be inspected by the Park Planner prior to pouring concrete. Do not place formwork until the location has been confirmed by the Park Planner.
- C. Establish and maintain required lines and grade elevations.
- D. Do not install concrete work over wet, saturated, muddy, or frozen sub-grade.
- E. Do not install concrete when air temperature is below 40 degrees.
- F. Use of calcium chloride, salt, or any other admixture to prevent concrete from freezing is prohibited.
- F. Protect adjacent work.
- G. Provide temporary barricades and warning lights as required for protection of project work and public safety.

PART 2 PRODUCT

2.01 MATERIALS

- A. Portland cement: ASTM C150, Type 1, natural color.
- B. Aggregate: Provide ASTM C33 normal weight aggregates, 1" maximum size, clean, uncoated crushed stone or gravel coarse aggregate free of materials which cause staining or rust spots; fine aggregate shall be clean natural sand.
- C. Water: Clean, fresh and potable.
- D. Air entraining admixture: ASTM C260.
- E. Water reducing admixture: ASTM C494.

2.02 MIXES

- A. Provide ASTM C94 ready-mixed concrete. Batch mixing at site is not acceptable.
- B. Strength:
 - 1. 3,600 psi minimum at 28 days for sidewalks.
- C. Slump range:
 - 1. 4" to 5" maximum for concrete sidewalks.
- D. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.

2.03 ACCESSORIES

- A. Forms: Wood or metal of sufficient strength to resist concrete placement pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects and distortion and height equal to full depth of concrete work. Provide 2" nominal thickness, surfaced plank wood forms for straight sections and sections with radius greater than 25'. For radius less than 25', use flexible metal, 1" lumber, or plywood forms to form radius bends. In all forming methods, the contractor shall install concrete formwork to resist lateral displacement. Irregularities in edges will not be permitted and will be cause for rejection of the affected area.
- B. Joint filler: Construction Grade Pressure treated pine 1/2" x 4", section to match concrete trail profile.
- C. Curing compound: ASTM C309, type 2, non-yellowing, non-staining liquid membrane forming type containing a fugitive dye.
- D. Reinforcing steel: ASTM A615, Grade 60 per ASTM A370, new domestic deformed steel bars.
- E. Form release agent: Non-staining chemical form release agent free of oils, waxes and other materials harmful to concrete.
- F. Joint Dowel Bars: #5 smooth, plain steel bars, ASTM A615, Grade 60. Cut bars true length with end cut square and free of burrs. Furnish metal or plastic expansion caps for end of each dowel in expansion joints. Design caps with one end closed and a minimum length of 3" to allow bar movement of not less than 2", unless otherwise indicated.
- G. Accessories: Provide spacers, chairs, ties and other devices necessary for properly spacing, placing, supporting and fastening reinforcement shall be of size and strength for the purpose intended. Accessories shall be plastic or galvanized as required.
- H. Cleats: Cleats shall be 2" X 4" wood 24" in length, for controlling the continuous alignment of the forms, where one form abuts against another form. Cleats shall be nailed behind the form with three (3) nails attaching the cleat to each form.
- I. Expansion Joint: 1/2" X 4" pressure treated pine construction, pressure treated pine, or redwood section to match profile.

PART 3 EXECUTION

3.01 INSPECTION

Examine sub-grades and installation conditions. Notify Park Planner of unsatisfactory conditions. Do not start concrete work until unsatisfactory conditions are corrected.

3.02 PREPARATION

Contractor shall designate and pay a recognized testing laboratory to perform all soil and compaction testing for this project. Such designation is subject to the approval of the Manager of Park Planning.

- A. Proof roll the sub-grade and do all necessary rolling and compacting to obtain firm, even sub-grade surface. Fill and consolidate depressed areas. Remove non-compacting materials, replace with granular base and compact to 95% of the maximum dry density in accordance with ASTM D698 Standard Proctor Method.
- B. Remove loose material and debris from base surface before placing concrete.
- C. Install, align and level forms. Stake and brace forms in place. Maintain following grade and alignment tolerances:
 - 1. Top of form: Maximum 1/8" in 10'-0".
 - 2. Vertical face: Maximum 1/4" in 10'-0".
- D. Coat form surfaces in contact with concrete with form release agent as necessary to assure separation from concrete without damage.
- E. Locate, place and support reinforcement chairs necessary to elevate bars during pouring. Use a minimum of one chair 24" O.C. each way.
- F. Provide reinforcing bars at curbs, ramps, and other locations indicated, adequately supported and secured to prevent displacement.
- G. Alignment of forms and joints shall not permit tangencies or angles. All alignments shall be made with gradual radius transitions.

3.03 INSTALLATION

- A. Concrete placement - Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete" and as specified.
- B. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing and curing. In cold weather comply with ACI 306, "Recommended Practice for Cold Weather Concreting." In hot weather comply with ACI 305, "Recommended Practice for Hot Weather Concreting."
- C. Moisten base to provide a uniform dampened condition at the time concrete is placed. Verify structures are at required finish elevation and alignment before placing concrete.
- D. Place and spread concrete to the full depth of the forms. Use only square ended shovels or concrete rakes for hand spreading and consolidating concrete. Exercise care during spreading and consolidating operations to prevent segregation of aggregate and dislocation of reinforcement.

- E. Concrete shall be thoroughly compacted during and immediately after placing by vibrating the concrete internally by means of mechanical vibrating equipment or by spading. To secure even and dense surfaces against forms, vibration shall be supplemented by working or spading by hand along form surfaces while concrete is still plastic.
- F. Place concrete in a continuous operation between expansion joints. Provide construction joints when sections cannot be placed continuously.
- G. Place concrete in one course, monolithic construction, for the full width and depth of concrete work. Provide minimum 4" thick walks and thickness to match paving for ramps, except as otherwise indicated.
- H. Strike off and bull float concrete after consolidating. Level ridges and fill voids. Check surface with a 10'-0" straightedge. Fill depressions and re-float repaired areas. Darby the concrete surface to provide a smooth level surface that will be ready for finishing.
- I. Provide handicapped ramps where indicated.
- J. Joints:
 - 1. Construct control, expansion, and construction joints properly aligned with face perpendicular to concrete surface.
 - 2. Provide tooled control joints, sectioning concrete into areas indicated. Tool joints to depths equal to not less than one-fifth (1/5) of the concrete thickness. Hand tool control joints in pattern and at spacing indicated. When not indicated, provide spacing equal to slab width and not greater than 10'-0" on center.
 - 3. Provide doweled expansion joints at all concrete to concrete connections, unless directed otherwise using expansion joint filler.
 - 4. Provide doweled expansion joints in concrete trail with 1/2" x 4" pressure treated pine or Wolmanized pine.
 - 5. Locate doweled expansion joints as indicated on the plans (max. spacing along trail not to exceed 100' O.C.). Align expansion joints in abutting curbs and walks.
 - 6. Install wood joint-filler full width and depth of joint. Recess top edge 1/8" below finished grade.
 - 7. Protect the top edge of the joint filler during concrete placement.
- K. Concrete finishing:
 - 1. Perform concrete finishing using mechanical or hand methods as required.
 - 2. Upon completion of floating and after bleed water has disappeared and concrete can sustain foot pressure with nominal indentation, cut concrete away from forms. Work edges with an edging tool. Round edges to 1/4" radius.
 - 3. Install control joints at indicated locations during edging operations.

- L. Complete surface finish as follows:
 - 1. Provide sidewalk and pavement surfaces with textured dry broom medium finish to match exactly to existing concrete walk.
 - 2. Edge outside edges and all joints with a radius-edging tool.
 - 3. Curbs and vertical wall faces: provide a smooth, hand rubbed finish.
 - 4. Vertical wall faces: Hand rubbed finish.
- M. Curing: Wet cure concrete by application of absorptive mats or fabric kept continuously wet or by application of waterproof sheet materials.
- N. Joint sealants:
 - 1. Install joint sealants where indicated in accordance with manufacturer's installation instructions. Clean and prime joints. Remove all dirt and loose coatings.
 - 2. Apply sealants in continuous beads, without open joints, voids, or air pockets. Hand tool and finish all joints.
 - 3. Confine materials to joint areas with masking tape or other precautions.
 - 4. Remove excess compound promptly as work progresses and clean adjoining surfaces.
 - 5. In rough surfaces or joints of uneven widths, install joint sealant well back into joints.

3.04 PROTECTION

Protect concrete work from damage due to construction and vehicular traffic until final acceptance. Exclude construction and vehicular traffic from concrete pavements for at least seven (7) days. Prevent vandalism to concrete from markings or bicycles. Markings or bicycle tracks in concrete will be cause for rejection and require reinstallation for the affected area.

3.05 CONCRETE TESTING AND QUALITY CONTROL

Contractor shall designate and pay a recognized testing laboratory to perform all testing and concrete design for this project. Such designation is subject to the approval of the Manager of Park Planning.

A. General

- 1. Allow the testing agency and Owner free access to material stockpile facilities for batching, mixing and placing concrete and the work in progress. The testing agency is to meet requirements of ASTM E329 and have the equipment and materials necessary for sampling and testing required herein.
- 2. Quality control is the Contractor's responsibility. Results of any testing performed by the testing agency will be made available to the Contractor and the Contractor may use such testing as part of the Contractor's Quality Control program.
- 3. Furnish molds and concrete for all testing including testing performed by the Owner or the testing agency. Provide tools necessary for making test specimens, slump tests and yield

tests. Furnish labor and equipment for obtaining and handling all test samples.

4. At least 24 hours in advance of placing concrete in the structure, notify the Owner of the date, time and location in the structure and quantity of concrete to be placed.
5. Each concrete mix type has specific performance requirements. Verify that requirements are met for each mix type by sampling and testing at least equal to that required herein.
6. Verify that batch tickets from ready-mix supplier properly describe the mix for the work being performed prior to permitting the discharge of concrete from the supplier's truck.
7. Ensure that the ready-mix transport trucks are equipped with a drum revolution counter and the drum turn rates are established prior to concrete placements with the approval of the Owner.

B. Sampling and Testing Fresh Concrete - Fresh concrete used in the work shall be sampled and tested by the testing laboratory using technicians certified by the American Concrete Institute to determine its acceptability as required by ACI 318 and to demonstrate general conformance with specified properties as follows:

1. Sampling Fresh Concrete: ASTM C172.
2. Slump: ASTM C143; one test for each set of compressive strength test specimens.
 - a. When superplasticizers are added at site, make slump tests from each concrete load before adding superplasticizer and after superplasticizer has been properly mixed into the fresh concrete.
 - b. When liquid nitrogen is used to cool the concrete, make slump test before adding liquid nitrogen to the concrete mix.
3. Air Content: ASTM C173, volumetric method for lightweight concrete; ASTM C231 pressure method for normal weight concrete; one for each set of compressive strength specimens.
4. Concrete Temperature: ASTM C1064; test concrete hourly when air temperature is 40 deg. F (4 deg. C) and below, and when 80 deg. F (27 deg. C) and above; and when each set of compression test specimens is made.
5. Compressive Strength Specimens: ASTM C31; one set of four standard cylinders for each 50 cubic yards or fraction thereof, of each concrete type placed in any one day, or for each 5000 sq. ft. of surface area placed, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens.
6. Compressive Strength Tests: ASTM C39; one specimen tested at seven (7) days, two at 28 days, and one retained in reserve for later testing if required.

3.06 CLEANING

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from concrete operations. Sweep concrete sidewalks and pavement, wash free of stain, discoloration, dirt and other foreign material prior to final acceptance.

END OF SECTION 02515

**SECTION 02 41 00
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.
- B. Any other items specifically identified to be removed, relocated or salvaged for Owner.
- C. Provide barricades for demolition work to go on while business remains in operation.
- D. Coordinate salvage items with Owner and Architect.

1.02 RELATED REQUIREMENTS

- A. Section 01700 – Project Closeout: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- B. Section 01 10 00 - Summary: Limitations on General Contractor's use of site and premises.
- C. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

1.03 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- C. Certification: Indicating contractor or renovation firm is EPA-certified, identifying certified on site staff, furnish evidence of worker training by certified staff and provide summary of lead-safe work practices to be implemented as required by 40 CFR 745.
- D. Do not commence demolition in the existing facility until Owner has completed removal of equipment and furniture and Architect has issued direction to proceed.
- E. Schedule: Submit schedule indicating proposed methods and sequence of operations for demolition work to Owner's Representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.
- F. Submit list of major items and equipment that will be demolished and removed from the site for review and approval by Owner.
- G. Secure all required City Permits and Permits of regulatory authorities.
- H. Prior to commencement of demolition work, inspect areas in which work will be performed. Photograph existing conditions, structures, equipment and surrounding properties which could be misconstrued as damaged resulting from demolition work; file with the Architect prior to starting work.
- I. Conditions of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

1.04 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of three years of documented experience.

1.05 PROJECT CONDITIONS

- A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- B. Comply with other requirements specified.

- C. If any existing material to be disturbed is thought to contain asbestos, the General Contractor is to notify Owner promptly for removal.

1.06 TRAFFIC

- A. Conduct demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
- B. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 SCOPE

- A. Remove portions of existing buildings as indicated.
- B. Remove other items indicated, for salvage and relocation.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using approved fill.
- D. Remove portions of roofing and decking for installation of new rooftop unit(s).

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with other requirements specified in the Specifications.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 8. Do not close or obstruct roadways or sidewalks without permit.
 - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 SALVAGE MATERIALS

- A. Partial Demolition and Removal: Items indicated to be removed but of salvable value to General Contractor may be removed from structure as work progresses. Transport salvaged

items from site as they are removed. Storage or sale of removed items on site will not be permitted.

- B. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of the Owner. Notify Owner's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.
- C. The Owner will notify the General Contractor of material that will be salvaged by General Contractor. General Contractor is to disconnect and remove equipment. The Owner may remove items or equipment from site. Refer to Drawings.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Maintain secure exterior building enclosure except for access to building.
- E. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; Pay all Fees.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.
- E. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave site clean.
- F. Repair any demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of demolition work. Repair adjacent construction or surfaces soiled or damaged by demolition work.
- G. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

END OF SECTION

SECTION 04 05 11
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 01400 - Quality Control: Preconstruction Testing and Field Quality Control.
- B. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.
- C. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Field-mix all mortar and grout.
- B. Mortar Color: Color shall match existing mortar.
- C. Mortar Mix Designs: ASTM C270, Proportion Specification.
 - 1. Maximum tested compressive strength of mortar samples, made pre-construction and during construction, at 28 days shall not exceed industry standard limits.
 - 2. Masonry below grade and in contact with earth: Type S.
 - 3. Exterior Masonry Veneer: Type N.
 - 4. Exterior Cavity Walls: Type S mortar with Type N pointing mortar.
 - 5. Exterior, Loadbearing Masonry: Type S.
 - 6. Exterior Repointing Mortar: Type N with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
 - 7. Interior, Loadbearing Masonry: Type S.
 - 8. Interior, Non-loadbearing Masonry: Type N.
 - 9. Calcium chloride or other admixtures that may corrode metal masonry accessories are not to be used.

- D. Grout Mix Designs:
 - 1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C94/C94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 MATERIALS

- A. Portland Cement: ASTM C150.
 - 1. Type: Type I - Normal.
 - 2. Color: Color as required to produce approved color sample Color as required to match existing.
 - 3. Note: Masonry Cement and Masonry mix are not to be used on this project.
- B. MASONRY Cement is PROHIBITED for use on this project.
- C. Pre-blended mortar mixes shall not be used on this project.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Quicklime: ASTM C5, non-hydraulic type.
- F. Mortar Aggregate: ASTM C144.
- G. Grout Aggregate: ASTM C404.
 - 1. Course aggregate - maximum 3/8 inch size.
 - 2. Fine aggregate - Standard masonry type sand.
- H. Water: Clean and potable.
- I. Bonding Agent: Latex type.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. Do not use air-entraining agents.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.04 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

2.05 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01400.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
 - 2. Maximum compressive strength of mortar shall not exceed 90 percent of the compressive strength of the masonry units in which mortar is to be installed.
- C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.
- B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.
- B. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

3.03 GROUTING

- A. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 12 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01400.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.
 - 1. Test frequency: One set of six cubes at start of masonry work and at every 5,000 SF of wall.
- C. Test and evaluate grout in accordance with ASTM C1019 procedures.
 - 1. Test frequency: periodic testing of grout and rebar (minimum once every two days) for structural walls.
- D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay Facing Brick. (At hollow metal frames tooth-in brick.)
- B. Reinforcement and Anchorage.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 11 - Masonry Mortaring and Grouting.
- B. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- C. Section 07 90 05 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.
 - 1. Masonry Cleaning Applicator and Product representative shall be present during meeting.

1.04 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Masonry Cleaning Submittals:
 - 1. Cleaning Plan: Written description of cleaning process, including materials, methods, equipment, and sequencing of work.
 - 2. Applicator Qualifications: Submit qualifications of applicator.
 - a. Certification stating applicator is experienced in the application of the specified products.
 - b. List of recently completed masonry cleaning projects, including project name and location, names of owner and architect, description of cleaning products used and substrates, applicable local environmental regulations, and application procedures.
 - 3. Environmental Regulations: Submit description for testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Submit applicable local environmental regulations.
 - 4. Protection: Submit description for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces during the work from contact with masonry cleaners, residues, rinse water, fumes, wastes, and cleaning effluents.
 - 5. Surface Preparation: Submit description for surface preparation of substrates to be completed before application of masonry cleaners.
 - 6. Application: Submit description for application procedures of masonry cleaners.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.
- B. Fire Rated Assemblies: Conform to applicable code for UL Assembly No. as indicated on the Drawings.
- C. Manufacturers:
 - 1. Masonry Manufacturer shall have at least 5 years experience in manufacturing specified product.

2. Masonry Cleaner Manufacturer capable of providing field service representation during installation and who will approve the installer and application method.
- D. Installers:
1. Masonry Contractor shall have at least 5 years experience in similar types of work and be able to furnish a list of previous jobs and references if requested by the Architect.
 2. Masonry Cleaner Installer experienced in performing this type of work and who has specialized in work similar to the type required for this project.
- E. Masonry Cleaner Test Panels:
1. Before full-scale application, test products to be used on test panels.
 2. Review manufacturer's product data sheets to determine suitability of each product for each surface.
 3. Apply products using manufacturer-approved application methods, determining actual requirements for application.
 4. After 48 hours, review effectiveness of cleaning or treatment, compatibility with substrates, and ability to achieve desired results.
 5. Obtain approval by Architect and Owner of workmanship, color, and texture before proceeding with work.
 6. Test Panels: Inconspicuous sections of actual construction.
 - a. Location and number as selected by Architect.
 - b. Size; 4 feet by 4 feet.
 - c. Repair unacceptable work to the satisfaction of the Architect and Owner.
 7. Regulatory Compliance
 - a. Comply with applicable federal, state, and local environmental regulations including testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Store mortar materials on a dunnage in a dry place.
- C. During freezing weather, protect masonry units with tarpaulins or other suitable material.
- D. Protect reinforcement and accessories from elements.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.
- B. Masonry Cleaning Requirements: Do not apply products under conditions outside manufacturer's requirements, which include:
 1. Surfaces that are frozen; allow complete thawing prior to installation.
 2. Surface and air temperatures below 40 degrees F.
 3. Surface and air temperatures above 95 degrees F.
 4. When surface or air temperature is not expected to remain above 40 degrees F for at least 8 hours after application.
 5. Wind conditions that may blow materials onto surfaces not intended to be treated.
 6. Less than 24 hours after a rain or 6 hours before rain is expected after installation.

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Manufacturers (if required):
 1. Acme Brick Company: www.brick.com
 2. Boral Bricks, Inc: www.boralbricks.com.
 3. Interstate Brick Company: www.interstatebrick.com
 4. Substitutions: See section 01 60 00 - Product Requirements.

- B. Facing Brick: ASTM C216 or ASTM C652, Type FBX or HBX, Grade SW.
 - 1. Provide commercial grade only.
 - 2. Remove existing brick, clean, and reuse.
 - 3. Color and texture: Brick shall match existing where indicated.
 - 4. Modular: 2-1/4(h) x 3-5/8(d) x 7-5/8(w)
 - 5. Nominal size: As indicated on drawings.
 - 6. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
 - 7. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67.

2.02 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 04 05 11.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
 - 2. Heckmann: www.heckmannbuildingproducts.com
 - 3. Sandell Construction Solutions; Product Truss Reinforcement and Ladder Reinforcement: www.sandellmfg.com.
 - 4. WIRE-BOND: www.wirebond.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
 - 1. Truss Mesh #120 (EH) extra heavy manufactured by Hohmann & Barnard, Inc.
 - 2. Ladder Mesh #220 (EH) extra heavy manufactured by Hohmann & Barnard, Inc.
 - 3. Use pre-fabricated outside corners.

2.04 ACCESSORIES

- A. Cleaning Solution: Not harmful to masonry work or adjacent materials. Do not use Muriatic acid. Provide minimum test area of 4 feet X 4 feet, or greater if recommended by product manufacturer, for dilution rates, surface compatibility and desired results. Test area shall be reviewed and accepted by the Architect in writing prior to proceeding with cleaning work.
 - 1. Manufacturers:
 - a. Diedrich Technologies, Inc.: www.diedrichtechnologies.com.
 - b. Prosoco, Inc.: www.prosoco.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. New Brick Masonry Cleaner: Verify with masonry manufacturer that cleaner is acceptable.
 - a. Diedrich Technologies, Inc.; Product "200 Lim-Solv Cleaner" for fired clay dark colored brick: www.diedrichtechnologies.com.
 - b. Prosoco, Inc.; Product "Sure Klean 101 Lime Solvent" for fired clay dark colored brick: www.prosoco.com.
 - c. Diedrich Technologies, Inc.; Product "202 New Masonry Detergent" for fired clay red brick: www.diedrichtechnologies.com.
 - d. Prosoco, Inc.; Product "Sure Klean 600" for fired clay red brick: www.prosoco.com.
 - e. Diedrich Technologies, Inc.; Product "202V Vana-Stop" for light colored and sensitive brick and stone: www.diedrichtechnologies.com.
 - f. Prosoco, Inc.; Product "Sure Klean Vana Trol" for light colored and sensitive brick and stone: www.prosoco.com.
 - g. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Follow recommendations of BIA for installation of brick masonry.
- C. Follow recommendations of NCMA for installation of concrete masonry units.
- D. Masonry Cleaning Surface Preparation
 - 1. Protect surrounding areas, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces during the work from contact with masonry cleaners, residues, rinse water, fumes, wastes, and cleaning effluents in accordance with manufacturer's written instructions.
 - 2. On surfaces to be coated or treated, remove dirt, dust, oil, grease, and other contaminants that would interfere with penetration or performance of products; where cleaners are required, use products recommended by manufacturer; rinse thoroughly and allow to dry completely.
 - 3. Apply all specified sealants and caulking and allow curing before cleaning process begins.
 - 4. Divert and protect pedestrian and auto traffic.
 - 5. Avoid wind drifting of spray of cleaning products, residues, and rinse water.
 - 6. Protect open joints.
 - 7. Clean interior masonry surfaces before installation of interior finishes, doors, hardware, metal fixtures, and all other interior non-masonry materials.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- B. Masonry Cleaning Requirements: Do not apply products under conditions outside manufacturer's requirements.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

- H. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- J. At infill conditions, tooth into existing masonry.

3.06 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.

3.07 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, glazed frames, wood nailing strips, anchor bolts, and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.08 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/8 inch, plus 1/8 inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.09 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10 MASONRY CLEANING FIELD QUALITY CONTROL

- A. Follow Masonry Cleaner manufacturer's written instructions and take necessary precautions in order to protect installed products and materials of other trades that may be affected by cleaning process.
- B. Inspection:
 - 1. Inspect the masonry cleaning work with the General Contractor, Architect, applicator, and product representative, and compare with test panel results approved by the Architect. Determine if the substrates are suitably clean.
- C. Manufacturers' Field Services

1. Provide the services of the manufacturer's authorized field representative to verify that installed products comply with manufacturer's requirements and with the standard established by the Architect-approved test panels.

3.11 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.
- E. Consult masonry manufacturer for acceptable cleaners.
- F. Leave surfaces thoroughly clean and free of all mortar and other soiling.
- G. Use manual brush operation for cleaning face brick.
- H. Do not use abrasive materials, including other masonry units, to clean surface of coated masonry.
- I. Do not use high pressure sprayer or any other method that significantly adds water to the masonry.

3.12 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel, aluminum, and ferrous metal items.
- B. Miscellaneous metal fabrications and specialty products.
- C. Exterior stair handrails.

1.02 RELATED REQUIREMENTS

- A. Section 02515 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 09 90 00 - Painting and Coating: Paint finish.

1.03 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings for Steel Stairs.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Plates: ASTM A 283.
- D. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26.
- F. Aluminum-Alloy Die Castings: ASTM B85/B85M.
- G. Bolts, Nuts, and Washers: Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Verify dimensions on site prior to shop fabrication.
- C. Fabricate items with joints tightly fitted and secured.
- D. Continuously seal joined members by intermittent welds and plastic filler.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
- B. Lintels: As detailed; galvanized finish.

2.05 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be imbedded in masonry, and items specified for exterior finish.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.
- G. Field paint all castings in contact with the ground on the inside of casting with one coat of bituminous paint and on the outside of casting where it is in contact with grade. Provide one coat of rust inhibited primer to castings above grade.

2.06 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Interior Aluminum Surfaces: Class I natural anodized.
- C. Comply with AA DAF-45 for aluminum finishes required.
- D. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- E. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.

- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.08 SCHEDULE

- A. Provide and install items listed in Schedule and shown on Drawings with anchorage and attachments necessary for installation.
- B. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
- C. Items of Work - Custom Fabricated:
 - 1. Galvanized steel pipe handrails at front entrance.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated .
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- G. Install stock manufactured items in accordance with manufacturer's directions.
- H. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.
- I. At loose plates, clean concrete and masonry bearing surfaces of any bond-reducing materials. Clean bottom surface bearing plates.
- J. Replace, repair or touch up pre-finished items as directed by Architect.

3.04 DISSIMILAR MATERIALS

- A. Where aluminum surfaces will contact steel, other incompatible metals, masonry, stone or concrete, keep the aluminum surfaces from direct contact with such dissimilar material by painting the compatible metal with prime coat of zinc chromate primer followed by one or two coats of aluminum metal paint or other suitable protective coating excluding those containing lead pigmentation.

3.05 CLEAN UP

- A. Remove all trash and debris resulting from installation of products and equipment. Sweep clean and leave in a clear and orderly fashion.

3.06 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof-mounted curbs.
- B. Roofing nailers.
- C. Roofing cant strips.
- D. Preservative treated wood materials.
- E. Fire retardant treated wood materials.
- F. Miscellaneous framing and sheathing.
- G. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- B. Section 06 20 00 - Finish Carpentry.

1.03 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, application instructions, and fire retardant sheathing.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
 - 1. Pressure Treated Wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with referenced standards.
 - 2. Preservative Treated Wood: Submit certification for water-borne preservative that moisture content was reduced to maximum 19% for lumber and 15% for plywood after treatment.
 - 3. Fire Retardant Treated Wood: Submit certification by testing plant stating chemicals and process used, conformance with referenced standards and governing ordinances, and non-bleeding quality of the treatment.
 - 4. Structural Values: Where materials are provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, in the form of a signed copy of the applicable portion of the producer's grading rules for design values.

1.04 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- C. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWPA standards.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.06 WARRANTY

- A. See Section 01700 - Project Closeout - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.02 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum. See Section 09 21 16.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Metal nailing discs:
 - a. Flat caps, minimum 1 inch diameter.
 - b. Minimum 30 gage sheet metal.
 - c. Formed to prevent dishing.
 - d. Bell or cup shapes not acceptable.
 - 4. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

2.04 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
 - 1. Manufacturers:
 - a. Arch Wood Protection, Inc; Dricon: www.wolmanizedwood.com.
 - b. Hoover Treated Wood Products, Inc: www.frtw.com.
 - c. Osmose, Inc: www.osmose.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.

3. Interior Type A: AWP A U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
 4. Use fire retardant treated lumber and plywood at the following locations:
 - a. Blocking, bracing, nailers, and sill plates within walls, above ceilings and within return air plenums.
 - b. Elsewhere as required by code.
- C. Preservative Treatment:
1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Viance, LLC: www.treatedwood.com.
 - c. Osmose, Inc: www.osmose.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 2. Treat lumber in contact with roofing, flashing, or waterproofing.
 3. Treat lumber in contact with masonry or concrete.
 4. Treat lumber less than 18 inches above grade.
 5. Treat lumber in other locations as indicated.
- E. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
1. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 2. Treat plywood in contact with roofing, flashing, or waterproofing.
 3. Treat plywood in contact with masonry or concrete.
 4. Treat plywood less than 18 inches above grade.
 5. Treat plywood in other locations as indicated.
- F. Preservative Pressure Treatment of Lumber in Contact with Soil: AWP A U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft retention.
1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

- A. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

- A. Waste Disposal:
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

**SECTION 06 20 00
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 08 80 00 - Glazing:
- C. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.
- D. Section 12 32 00 - Manufactured Casework: Shop fabricated custom cabinet work.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware and finish hardware.
- C. Samples: Submit two samples of finish plywood, 12 x 12 inch in size illustrating wood grain and specified finish.
- D. Samples: Submit two samples of wood trim 12 inch long.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium grade.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.
- B. Do not deliver finish carpentry materials until job site conditions and operations which could damage, soil or deteriorate work are complete.
- C. Store products and materials in ventilated, interior locations under constant minimum temperature of 60 degrees F. and relative humidity not to exceed 55%.

1.08 PROJECT CONDITIONS

- A. Install finish carpentry products only when temperature and humidity conditions have been stabilized and will be maintained.
- B. Maintain temperature and moisture conditions as recommended by woodwork fabricator from date of installation through remainder of construction period.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.

- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: Spruce, pine, douglas fir species, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: red oak species, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Softwood Plywood Exposed to View: Face species Pine or Douglas Fir, plain sawn, medium density fiberboard core; PS 1 Grade A-B; glue type as recommended for application.
- B. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.
- C. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

2.05 PLASTIC LAMINATE MATERIALS

- A. Laminate finishes in this section are intended to be used for wall or component finishes, not for cabinet work specified elsewhere.
- B. See Section 12 32 00 - Manufactured Casework for Laminate Materials to be provided and associated with Manufactured Casework.
- C. Plastic Laminate: NEMA LD 3, HGS or VGS; color as selected; textured, low gloss finish .
- D. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.
- E. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.06 FASTENINGS

- A. Fasteners: Of size and type to suit application.
- B. Concealed Joint Fasteners: Threaded steel.

2.07 ACCESSORIES

- A. Lumber for Shimming, Blocking, and nailers: Softwood lumber of pine species.
- B. Plastic Edge Trim: Extruded convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness; color as selected.
- C. Aluminum Edge Trim: Extruded convex shape; smooth surface finish; self locking serrated tongue; of width to match component thickness; natural mill finish.
- D. Glass: Type 1/4" clear tempered as specified in Section 08 80 00.
- E. Primer: Alkyd primer sealer.
- F. Wood Filler: Solvent base, tinted to match surface finish color.

2.08 HARDWARE - AS SPECIFIED IN SECTION 12 32 00 - MANUFACTURED CASEWORK.

2.09 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.

- B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with plastic trim.
- D. Shop prepare and identify components for book match grain matching during site erection.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- G. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for Grade specified and as follows:
- E. Back prime woodwork items to be field finished, prior to installation.
- F. Items not having shop finish will be finished in field as specified in Section 09 90 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install hardware supplied by Section _____ in accordance with manufacturer's instructions.
- E. Install using skilled workmen in accordance with manufacturer's printed instructions and recommendations.
- F. Install work in accordance with AWI Premium Quality Standards. Handle materials to avoid dents and other damages.
- G. Shim as required using concealed shims.
- H. Before making cutouts, drill pilot holes at corners.
- I. Distribute defects allowed in quality grade to best overall advantage when installing job assembled woodwork items.
- J. Install trim and molding in unjointed lengths for openings and for runs less than maximum length of lumber available. For longer runs, use only one piece less than maximum length available in straight run. Allow no joints closer than 12 feet apart.
- K. Stagger joints in adjacent members.
- L. Cope moldings at returns and miter at corners.
- M. Attach woodwork securely in place with uniform joints providing for thermal and building movements; blind nail where possible.

- N. Use finishing nails where exposed
- O. Set exposed heads for filling.
- P. Secure woodwork to anchors, built-in blocking, or directly attach to substrates.
- Q. Cover exposed edging to match thickness of shelving.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 90 00.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.
- C. Preparing sealant substrate surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry.
- B. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- C. Section 09 21 16 - Gypsum Board Assemblies: Acoustic sealant.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.04 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two samples, 1/4 x 4 inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.06 MOCK-UP

- A. Provide mock-up of sealant joints, each 5 feet long, illustrating sealant type, color, and tooled surface for each type of sealant specified.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Approved mock-up may remain as part of the Work.

1.07 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- B. Do not install solvent curing sealants in enclosed building spaces.

1.08 WARRANTY

- A. See Section 01700 - Project Closeout: Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a three year period after Date of Substantial Completion.
- C. Warranty: 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
 - 1. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us.
 - 2. Dow Corning Corporation: www.dowcorning.com.
 - 3. Hilti, Inc: www.us.hilti.com.
 - 4. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 - 5. Pecora Corporation: www.pecora.com.
 - 6. Red Devil: www.reddevil.com.
 - 7. Tremco Global Sealants: www.tremcosealants.com.
 - 8. Sherwin-Williams Company: www.sherwin-williams.com.
 - 9. W.R. Meadows, Inc: www.wrmeadows.com.
 - 10. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SEALANTS

- A. Type A - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; multi-component.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Lap joints in exterior sheet metal work.
 - e. Other exterior joints for which no other sealant is indicated.
 - 3. Polyurethane Products:
 - a. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
 - b. Master Builders Solutions by BASF; MasterSeal SL 2 (Sonolastic NP2): www.master-builders-solutions.basf.us.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 4. Polysulfide Products:
 - a. W.R. Meadows, Inc; Deck-O-Seal Gun Grade: www.wrmeadows.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type B - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
 - 1. Face color: gray.
 - 2. Size as required to provide weathertight seal when installed.
 - 3. Applications: Use for:
 - a. Exterior wall expansion joints - secondary sealant behind liquid sealants.
- C. Type C - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
 - 3. Products:
 - a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
 - b. BASF Construction Chemicals-Building Systems; Sonolac: www.buildingsystems.basf.com.
 - c. Tremco Global Sealants; Tremflex 834: www.tremcosealants.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

- D. Type D - Plumbing fixture/Tile Sanitary Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
 - 2. Products:
 - a. Dow Corning Corporation; Product 786 Silicone Sealant; www.dowcorning.com
 - b. Momentive Performance Materials, Inc. (formerly GE Silicones); Product SCS1700: www.momentive.com.
 - c. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: www.pecora.com.
 - d. Tremco Global Sealants; Tremsil 200 with fungicide: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Type E - Acoustical Sealant for Concealed Locations:
 - 1. Composition: Permanently tacky non-hardening butyl sealant.
 - 2. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - b. Between outlet boxes and gypsum board or masonry.
 - c. Perimeter of penetrations in acoustical walls.
 - 3. Products:
 - a. Tremco Global Sealants; Acoustical Sealant: www.tremcosealants.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Type H - Silicone Sealant: ASTM C920, Grade NS, Class 25 minimum; Uses NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Joints between countertop backsplashes and adjacent walls.
 - 3. Products:
 - a. Dow Corning Corporation; 790 Silicone Building Sealant: www.dowcorning.com.
 - b. Momentive Performance Materials, Inc (GE Silicones products); SilPruf-SCS2000: www.momentive.com.
 - c. Tremco Global Sealants; Spectrem 3: www.tremcosealants.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width. In horizontal joints, use solid neoprene or butyl rubber, Shore A hardness of 70.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint dimensions are as shown on the drawings and recommended by the manufacturer.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Commencement of sealant application constitutes acceptance of substrate conditions by installer.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193 (and ASTM C 919 for acoustical applications).
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave. Allow sealant to achieve a firm skin before surface coating is applied.
- I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

**SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated steel doors and frames.
- B. Special doors in existing frames.
- C. Existing openings, V.I.F.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 11 - Masonry Mortaring and Grouting: Mortar fill of metal frames in masonry.
- B. Section 08 71 00 - Door Hardware.
- C. Section 09 90 00 - Painting and Coating: Field painting.

1.03 SUBMITTALS

- A. Section 01310 - Construction Schedules, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Samples: Submit two samples of metal, 2 x 2 inches in size showing factory finishes, colors, and surface texture.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
 - 1. Assa Abloy Ceco or Curries: www.assaabloydss.com.
 - 2. Republic Doors: www.republicdoor.com.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/us.
 - 4. Technical Glass Products; SteelBuilt Window & Door Systems: www.tgpamerica.com.
 - 5. P-W Metal Products; www.piperweatherford.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
 - 1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 2. Door Top Closures: Flush with top of faces and edges with inverted steel channel closure. Seal joints watertight.
 - 3. Door Edge Profile: Beveled on both edges.
 - 4. Door Texture: Smooth faces.

5. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
6. Galvanizing at toilets, showers, commercial kitchen areas and all exterior conditions: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
7. Finish: Factory primed, for field finishing.
8. Frame Reinforcement:
 - a. Hinge Reinforcement - 7 gauge min.
 - b. Closer Reinforcement - 14 gauge min.
 - c. Strike Reinforcement - 16 gauge min.

2.03 STEEL DOORS

- A. Interior Doors, Fire-Rated:
 1. Grade: ANSI A250.8 - SDI-100; Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Rate of Temperature Rise Across Door Thickness : In accordance with local building code.
 - b. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
 - c. Attach fire rating label to each fire rated unit.
 3. Core: Mineral board.

2.04 STEEL FRAMES

- A. General:
 1. Comply with the requirements of grade specified for corresponding door.
 - a. At interior door openings up to 6'-0" wide: 16 gage thick material.
 - b. At interior door frames with door openings greater than 6'-0" wide: 14 gage thick material.
 2. Finish: Factory primed, for field finishing.
 3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
 4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
 5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
 6. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.
 7. Fabricate frames with mitered, welded corners. Weld all intersections of frames. Provide a watertight seal at all joints of exterior frames.

2.05 ACCESSORY MATERIALS

- A. Astragals for Double Doors: Specified in Section 08 71 00.
 1. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.
- B. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- C. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.
- D. Anchors: Three per jamb, of type to suit supportive construction.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, baked on.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Existing frames to be modified to accept new door hardware, including strikes, hinges, closers, etc.
- B. Coat inside of frames to be installed in masonry 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. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Coordinate installation of hardware.
- E. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8 - SDI-100.
- B. Maximum Diagonal Distortion: 1/8 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE - SEE DRAWINGS

END OF SECTION

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow steel and aluminum doors.
- B. Hardware for fire-rated doors.
- C. Weatherstripping, seals and door gaskets.
- D. The Schedule of Finish Hardware and/or Hardware Sets in this section are assumed to be complete. However, the omission of any item or items shall not relieve this Contractor from furnishing them. Furnishing of all hardware is required to fully complete the entire hardware requirements of the project, except for items specifically listed under List of Work Not Included. Items of hardware not specifically listed shall conform in class, quality and type of hardware in like and similar locations.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 43 13 - Aluminum-Framed Storefronts: Hardware for doors in storefront, including:
 - 1. Integral weatherstripping.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

1.04 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
- C. Samples: Prior to preparation of hardware schedule:
 - 1. Submit 1 sample of any items required by architect illustrating style, color, and finish.
 - 2. Samples will be incorporated into the Work.
- D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements. Submit copies of the completed Hardware Schedule for review prior to ordering any material. Acceptance of the schedule in no way releases Contractor from complying with specifications, nor from providing necessary fire rated, labeled hardware. Once Hardware Schedule is reviewed for compliance, the Hardware Schedule shall take precedence over any hardware listing in the Drawings or Specifications.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- F. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- G. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- H. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- I. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Hardware Supplier Qualifications: Company specializing in supplying institutional door hardware with three years of documented experience.
- C. Hardware Supplier Personnel: Employ a qualified person to assist in the work of this section.
- D. All hardware shall consist of the highest quality of builders finishing hardware. It shall be the heaviest patterns and the highest grade of manufacturer and suitable for all purposes.
- E. All hardware shall be a uniform color and finish appearance, reasonably free from imperfections affecting the appearance and serviceability.
- F. Surface of all meetings shall be true, smooth and free from burrs, and all portions of lock mechanism, etc. which come in contact or bear upon other parts shall be dressed to true, smooth surface.

1.06 PRE-INSTALLATION MEETING

- A. Convene one week prior to commencing work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually, complete with all trim, screws, bolts, washers, etc; label and identify each package with door opening code to match hardware schedule.
- B. All hardware required for shop application shall be delivered to shop, mill or factory of subcontractors at Contractor's expense and in ample time so as not to impede the progress of the work.
- C. All other hardware shall be delivered to the building as directed by the Contractor in sufficient time for proper inspection before setting.
- D. All hardware shall have the required screws, bolts and fastenings necessary for its installation, packed in the same package with the hardware. All packages shall be legibly and adequately labeled, indicating the part of the work for which it is intended.
- E. Permanent security cores shall be delivered directly to the Owner's Representative as directed by the Architect. Permanent security cores shall not be delivered to the jobsite or Contractor.

1.08 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Coordinate Owner's keying requirements during the course of the Work.

1.09 WARRANTY

- A. See Section 01700 - Project Closeout, for additional warranty requirements.
- B. Provide five year warranty for door closers.
- C. Contractor shall agree to replace only at this own expense any items that prove in any way defective which is not due to ordinary usage.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
 1. Applicable provisions of federal, state, and local codes.

2. ADA Standards for Accessible Design.
 3. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
 4. Applicable provisions of NFPA 101, Life Safety Code.
 5. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- D. Finishes: All door hardware the same finish unless otherwise indicated.
1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 2. Secondary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
 3. Finish Definitions: BHMA A156.18.
 4. Exceptions:
 - a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
 - b. Door Closer Covers and Arms: Color to be selected by Architect from manufacturer's standard colors.

2.02 HINGES

- A. Hinges: Provide hinges on every swinging door.
1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 2. Provide ball-bearing hinges at all doors.
 3. Provide hinges in the quantities indicated.
 4. Provide non-removable pins on exterior outswinging doors.
- B. Butt Hinges: Comply with BHMA A156.1 and A156.7; heavy weight, unless otherwise indicated.
1. Provide hinge width required to clear surrounding trim.
 2. Five knuckle full mortise type with square corners.
 3. Flat button tip and matching plug.
 4. Non-removable pins for interior reverse bevel doors equipped with locking device; safety stud also acceptable. Non-rising pin for other doors.
 5. Non-ferrous construction at locations exposed to exterior atmosphere.
 6. Hinges weight for doors 40 inches width and over and for fire rated doors over 8 feet height. Heavy weight also required for high frequency doors where indicated in Hardware Sets.
 7. Anti-friction type for doors equipped with closers.

2.03 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
1. Hardware Sets indicate locking functions required for each door.
 2. If no hardware set is indicated for a swinging door provide an office lockset.
 3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
1. Provide cams and/or tailpieces as required for locking devices required.
- C. Keying: Grand master keyed.

2.04 MORTISE LOCKSETS

- A. Locking Functions: As defined in BHMA A156.13, and as follows:
1. Refer to Hardware Sets.

- B. Manufacturers - Mortise Locksets:
 - 1. Assa Abloy Corbin Russwin, Sargent, or Yale: www.assaabloydss.com.
 - 2. Best Access Systems, division of Stanley Security Solutions: www.bestaccess.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Mortise Locksets and Latchsets:
 - 1. Acceptable Products for cast Lever with Escutcheon Trim:
 - a. Best 47H
 - 2. Backset: 2-3/4 inches.
 - 3. Faceplate: 8 by 1-1/4 inches, adjustable from flat to bevel of 1/8 inch in 2 inches, finished to match trim on hinge side of door.
 - 4. Latch Bolt: Two piece anti-friction, 3/4 inch throw.
 - 5. Strike: ANSI standard 4-7/8 inch height, 1-1/4 inch curved lip.
 - a. Provide strikes with proper lip length to protect trim of the frame, but not to project more than 1/8 inch (3.2) beyond frame trim or the inactive leaf of a pair of doors.
 - b. Equip with wrought or plastic box.
 - c. Finish to match trim on hinge side of door.
 - 6. On single swing doors, provide latch strike plates only the minimum lip projection necessary to project from trim.

2.05 CLOSERS

- A. Closers: Complying with BHMA A156.4.
 - 1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
 - 2. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
 - 3. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to ensure the leaves close in proper order.
- B. Manufacturers - Closers:
 - 1. Assa Abloy Corbin Russwin or Norton: www.assaabloydss.com.
 - 2. LCN: www.lcnclosers.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Acceptable Products - Closers: Multi-sized, full featured door closers.
 - 1. Corbin Russwin DC6000
 - 2. Norton 7500
 - 3. LCN 4040
- D. Standard: ANSI A156.4, Grade 1.
- E. Required Features: Manufacturer's standard cast aluminum or cast iron construction.
 - 1. Regular or parallel arm mounting or top jamb mounting where indicated in Hardware sets.
 - 2. Rack and pinion construction with compression spring, fully hydraulic.
 - 3. Closing speed and latching speed controlled by independently operated valves.
 - 4. Adjustable spring power allowing adjustment up to 50 percent in field to suit individual door conditions.
 - 5. Adjustable backcheck for interior and exterior units.
 - 6. Maximum operating force of 8.5 pounds (3.86 kg) exterior doors, 5 pounds (2.27 kg) for interior doors, and 15 pounds (6.80 kg) for label doors.
 - 7. Size as recommended by manufacturer for door size and weight.
 - 8. Hold open, dead stop, or spring shock-absorbing arm features where indicated in Hardware Sets.
 - 9. Adjustable hydraulic delayed action feature where indicated in Hardware Sets.
- F. Accessories: Manufacturer's standard full size cover, non-metallic or metal construction for painted finish.
 - 1. Furnish with necessary arms, tracks, brackets, plates, shoes, and other accessories to suit door and frame conditions.
 - 2. Finish accessories to match cover.

- G. Mounting: Refer to hardware locations.
- H. It is the intent that no closer arms be visible on the sight side of the doors or on the exterior of the building.
- I. All closers shall have SNB (sex nuts and bolts).

2.06 STOPS AND HOLDERS

- A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
 - 1. Provide wall stops, unless otherwise indicated.
 - 2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
 - 3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.
- B. Manufacturers - Overhead Holders/Stops:
 - 1. Assa Abloy Rixson: www.assaabloydss.com.
 - 2. C. R. Laurence Co., Inc: www.crl-arch.com.
 - 3. Glynn-Johnson: www.glynn-johnson.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 GASKETING, THRESHOLDS AND SILENCERS

- A. Gaskets: Complying with BHMA A156.22.
 - 1. On each door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
 - a. Weatherstripping: Extruded aluminum with silicon seal bulb.
- B. Silencers: Preformed neoprene or rubber.
 - 1. Location and Quantities:
 - a. Single Doors: Three at strike jamb.
 - 2. Acceptable Product: For hollow metal frames.
 - a. Rockwood 608.
 - b. Trimco 1229A
- C. Manufacturers - Gasketing and Thresholds:
 - 1. Assa Abloy Rockwood: www.assaabloydss.com.
 - 2. National Guard Products, Inc: www.ngpinc.com.
 - 3. Pemko Manufacturing Co: www.pemko.com.
 - 4. Zero International, Inc: www.zerointernational.com.
 - 5. Triangle Brass Manufacturing Co., Inc., (Trimco): www.trimcobbw.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 PROTECTION PLATES AND ARCHITECTURAL TRIM

- A. Protection Plates:
 - 1. Kickplate: Provide on push side of every door with closer, except storefront and all-glass doors.
- B. Manufacturers - Protection Plates and Architectural Trim:
 - 1. Assa Abloy McKinney: www.assaabloydss.com.
 - 2. Hager Companies: www.hagerco.com.
 - 3. Triangle Brass Manufacturing Co., Inc: www.trimcobbw.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.09 KEY CONTROLS

- A. Key Control System: Dual tag indexed system complete with numbered labels and numbered tags, permanent key tags, working key tags, key loan and receipt system, three way cross index system, key gathering envelopes, and instruction manual.

2.10 FINISHES

- A. Except where indicated otherwise in Hardware Sets, comply with following:

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1. Typically: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 2. Surface Mounted Closers: Spray-painted to match other hardware.
- B. Special care is to be taken to make uniform the finish of all various manufactured items.
- C. Extruded aluminum products, except for specified gasketing, are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Hardware Schedule is not complete with respect to thickness of doors, hand and backset of hardware items, methods of fastening and other detail requirements.
- C. Check drawings and door schedule and provide required hardware for openings. Provide required hardware for labeled opening to conform with NFPA 80 and Building Code.
- D. Trim undesignated openings with hardware of equal quality and design to that specified for similar opening.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item: As shown on drawings.
1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
- D. Install finish hardware plumb, level and true to line.
- E. Cut and fit to substrate avoiding damage or weakening. Reinforce attachment substrates as necessary for installation and operation.
- F. Completely cover cutouts with hardware item.
- G. Mortise work to correct location and size without gouging, splintering or causing irregularities in exposed finish work.
- H. Installation at surfaces for Paint or Other Finish:
1. Where cutting and fitting is required on substrates to be painted or similarly finished, install, fit and adjust hardware prior to finishing.
 2. Remove hardware and place in original packaging.
 3. Reinstall between after finish operation is complete.
- I. Install hardware items affixed to concrete with machine screws and threaded expansion shields.
- J. Install weatherstripping at heads, and jambs at noted hollow metal doors. Seal opening in accordance with manufacturer's recommendations.
- K. All closers shall be thru-bolted.
- L. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- M. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- N. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.03 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

- B. Provide an Architectural Hardware Consultant/Supplier to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions .
- C. Provide two copies of certification to Architect.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.
- D. Check and adjust each operating hardware item to ensure proper operating or function of unit.
- E. Adjust all closers to comply with ADA Requirements.
- F. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
 - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- G. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
 - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
 - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
 - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.
- H. Prior to Substantial Completion date, readjust and relubricate as necessary.
- I. Repair or replace defective materials or units which cannot be adjusted and lubricated to operate freely and smoothly. Reinstall items found improperly installed.
- J. Lubricate moving parts as recommended by hardware manufacturer. Use graphite type lubrication if none other is recommended.

3.05 CLEANING

- A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01700.
- B. Do not permit adjacent work to damage hardware or finish.

3.07 DEMONSTRATION

- A. Demonstration and Instruction of Owner's Personnel: Provide to designated Owner's personnel.
- B. Instruct Owner's designated personnel in proper adjustments and maintenance of hardware and finishes at time of final hardware adjustment.

3.08 SCHEDULE - ATTACHED, FOLLOWING THIS SECTION.

HARDWARE SETS

GENERAL

- A. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.
 - 1. Abbreviations of Manufactures Used in Hardware Schedule
 - a. BST Best
 - b. COR Corbin Russwin
 - c. GLY Glynn-Johnson
 - d. HAG Hager
 - e. IVE Ives
 - f. MCK Mckinney
 - g. NGP National Guard Products
 - h. NOR Norton
 - i. PEM Pemko
 - j. RIX Rixson
 - k. ROC Rockwood Manufacturing
 - l. SAR Sargent
 - m. SCH Schlage
 - n. STN Stanley
 - o. TRM Trimco
 - p. VDP Von Duprin

END OF SECTION

HARDWARE SCHEDULE

HARDWARE SET NO. 1

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5 (REPLACE EXISTING – V.I.F. SIZE AND EXISTING FRAME PREP)	626	IVE
2	EA	EXIT DEVICE	33 A EO 299 (3'-0" pr. doors)(hex dogging)	626	SA
2	EA	90 DEG OFFSET PULL	8190 HD 10" O	626	IVE
1	EA	CYLINDER	TYPE AS REQUIRED - KEYED CONSTRUCTION CORE	626	BEST
1	EA	PERMANENT CORE	AS REQUIRED - MATCH EXISTING CITY KEY SYSTEM	626	BEST
2	EA	SURFACE CLOSER	4040XP/P4040XP EDA (WITH O/H STOP) MOUNTING BRACKET, SPACERS, SHOES & PLATES AS REQUIRED	689	LCN
1	SET	SEALS	152 VDKB H & J	DKB	NGP
1	EA	REMOVABLE MULLION	KR 4954 HEIGHT AS REQUIRED (VIF)	689	VON
2	EA	KICKPLATE	8400 8" x 2" LDW B4E	630	NGP
1	EA	SADDLE THRESHOLD	896 N X 6'	AL	NGP
2	SET	SEALS	2525C H & J	CL	NGP

NEW DOORS IN EXISTING FRAME – FIELD VERIFY SIZE AND EXISTING FRAME PREP

HARDWARE SET NO. 2

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CYLINDER LOCK	9K 3 7 AB 15 D - KEYED CONSTRUCTION CORE	626	BEST
1	EA	PERMANENT CORE	AS REQUIRED - MATCH EXISTING CITY KEY SYSTEM	626	BEST

ENTRANCE FUNCTION - TWIST LOCK

ALL EXISTING DOOR HARDWARE TO REMAIN EXCEPT FOR REPLACEMENT OF CYLINDER LOCK

HARDWARE SET NO. 3

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CYLINDER LOCK	9K 3 7 AB 15 D	626	BEST
1	EA	CYLINDER	TYPE AS REQUIRED - KEYED CONSTRUCTION CORE	626	BEST
1	EA	PERMANENT CORE	AS REQUIRED - MATCH EXISTING CITY KEY SYSTEM	626	BEST
1	EA	SURFACE CLOSER	4040XP/P4040XP EDA (WITH STOP) MOUNTING BRACKET, SPACERS, SHOES & PLATES AS REQUIRED	689	LCN

Florence Recreation Center Renovation

1	EA	KICK PLATE	8400 8" X 1" LDW B4E	630	IVE
1	SET	SEALS	2525C H & J	CLR	NGP

**NEW DOOR, FRAME AND HARDWARE
AT WEIGHTROOM**

HARDWARE SET NO. 4

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CYLINDER	40H – A – J14	626	BEST
			- KEYED CONSTRUCTION CORE		
1	EA	PERMANENT CORE	AS REQUIRED	626	BEST
			- MATCH EXISTING CITY KEY SYSTEM		

**OFFICE FUNCTION FLIP LOCK – FULL MORTISE – CONFIRM EXISTING DOOR PREP AND TRIM
ALL EXISTING DOOR HARDWARE TO REMAIN EXCEPT FOR REPLACEMENT OF MORTISE LOCK**

HARDWARE SET NO. 5

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
			(REVISE EXISTING – REVERSE SWING – V.I.F. SIZE AND EXISTING FRAME PREP)		
1	EA	CYLINDER LOCK	9K 3 7 AB 15 D	626	BEST
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
			- KEYED CONSTRUCTION CORE		
1	EA	PERMANENT CORE	AS REQUIRED	626	BEST
			- MATCH EXISTING CITY KEY SYSTEM		

**NEW DOOR IN EXISTING FRAME –
FIELD VERIFY SIZE AND EXISTING
FRAME PREP**

HARDWARE SET NO. 6

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CYLINDER LOCK	40H – A – J14	626	BEST
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
			- KEYED CONSTRUCTION CORE		
1	EA	PERMANENT CORE	AS REQUIRED	626	BEST
			- MATCH EXISTING CITY KEY SYSTEM		
1	EA	WALL STOP	WS406/407CCV	630	IVE

1 SET SEALS 2525 CH & J CLR NGP

NEW DOOR AT OFFICE 136B

HARDWARE SET NO. 7

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112 HD LENGTH AS REQ	628	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	CYLINDER LOCK	9K 3 7 AB 15 D	626	BEST
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
1	EA	PERMANENT CORE	- KEYED CONSTRUCTION CORE AS REQUIRED - MATCH EXISTING CITY KEY SYSTEM	626	BEST

HALF DOOR AT RECEPTION

HARDWARE SET NO. 8

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5 (REPLACE EXISTING – V.I.F. SIZE AND EXISTING FRAME PREP)	652	IVE
2	EA	EXIT DEVICE	33 A EO 299 (2'-8" Pair doors)	626	SA
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
1	EA	PERMANENT CORE	- KEYED CONSTRUCTION CORE AS REQUIRED	626	BEST
2	EA	90 DEG OFFSET PULL	- MATCH EXISTING CITY KEY SYSTEM	626	IVE
2	EA	SURFACE CLOSER	8190 HD 10" O	689	LCN
			4040XP/P4040XP EDA (WITH O/H STOP) MOUNTING BRACKET, SPACERS, SHOES & PLATES AS REQUIRED		
1	SET	SEALS	2525 C H & J	CLR	NGP
1	EA	REMOVABLE MULLION	KR 4854 HEIGHT AS REQUIRED (VIF)	689	VON
1	EA	KICKPLATE	8400 8" x 2" LDW B4E	630	NGP

NEW DOORS IN EXISTING FRAME – FIELD VERIFY SIZE AND EXISTING FRAME PREP

HARDWARE SET NO. 9

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5	652	IVE

Florence Recreation Center Renovation

2	EA	EXIT DEVICE	33 A EO 299 (3'-0" pair doors)	626	SA
2	EA	90 DEG OFFSET PULL	8190 HD 10" O	626	IVE
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
			- KEYED CONSTRUCTION CORE		
1	EA	PERMANENT CORE	AS REQUIRED	626	BEST
			- MATCH EXISTING CITY KEY SYSTEM		
2	EA	SURFACE CLOSER	4040XP/P4040XP EDA (WITH O/H STOP)	689	LCN
			MOUNTING BRACKET, SPACERS,		
			SHOES & PLATES AS REQUIRED		
1	SET	SEALS	2525 C H & J	CLR	NGP
1	EA	REMOVABLE MULLION	KR 4854 HEIGHT AS REQUIRED(VIF)	AL	NGP
2	EA	KICKPLATE	8400 8" x 2" LDW B4E	630	NGP

NEW DOOR, FRAME AND HARDWARE AT GYM

HARDWARE SET NO. 10

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	EXIT DEVICE	33 A EO 299 (3'-0" door)	626	SA
1	EA	CYLINDER	TYPE AS REQUIRED	626	BEST
			- KEYED CONSTRUCTION CORE		
1	EA	PERMANENT CORE	AS REQUIRED	626	BEST
			- MATCH EXISTING CITY KEY SYSTEM		
1	EA	90 DEG OFFSET PULL	8190 HD 10" O	626	IVE

ALL EXISTING DOOR HARDWARE TO REMAIN EXCEPT FOR PANIC DEVICE

HARDWARE SET NO. 11

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SADDLETHRESHHOLD	896 N X 6'	AL	NGP

ALL EXISTING DOOR HARDWARE TO REMAIN

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Sealant and back-up material.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Mirrors.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples 12 x 12 inch in size of glass units, showing coloration and design.
- E. Samples: Submit 12 inch long bead of glazing sealant, color as selected.
- F. Certificates: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 01700 - Project Closeout, for additional warranty requirements.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

- A. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
 - 1. Application: All exterior glazing unless otherwise indicated.
 - 2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 3. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 4. Total Thickness: 1 inch.

2.02 GLAZING UNITS

- A. Single Vision Glazing:

1. Application: All interior glazing unless otherwise indicated.
 2. Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch.
- B. Fire-Protection-Rated Glazing:
1. IBC Fire Protection Rating: As indicated on drawings.
 2. Safety Certification: 16 CFR 1201 Category II.
 3. Application: Provide this type of glazing in the following locations:
 - a. Glazed lites in fire doors.
 - b. Other locations indicated on the drawings.
 4. Thickness: 1/4 inch.

2.03 GLASS MATERIALS

- A. Float Glass Manufacturers:
1. AGC Flat Glass North America, Inc: www.na.agc-flatglass.com.
 2. Guardian Industries Corp: www.sunguardglass.com.
 3. Pilkington North America Inc: www.pilkington.com/na.
 4. PPG Industries, Inc: www.ppgideascape.com.
 5. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- B. Float Glass: All glazing is to be float glass unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
 3. Thicknesses: As indicated; for glazing comply with specified requirements for wind load design regardless of specified thickness.
- C. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
1. IBC Fire Protection Rating: As indicated on drawings.
 2. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
 3. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.

2.04 GLAZING COMPOUNDS

- A. Manufacturers:
1. Bostik Inc: www.bostik-us.com.
 2. Dow Corning: www.dowcorning.com.
 3. GE Plastics: www.geplastics.com.
 4. Pecora Corporation: www.pecora.com.
 5. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 6. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- B. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.
- C. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; with cured Shore A hardness range of 10 to 20; black color; non-skinning.
- D. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
- D. Glazing Gaskets: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; selected color.
- E. Window Tinting Film: Sun Mist 20% translucent film by Sunsational Solutions (phone 512.246.8468 web site: www.sunsationalsolutions.com) or equal. Refer to drawings for layout.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.
- C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealants in accordance with manufacturer's instructions.
- F. For security considerations, all glass shall be inside glazed.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.
- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
 - 1. Place glazing tape on glazing pane of unit with tape flush with sight line.
- F. Fill gap between glazing and stop with polyurethane type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
- G. Apply cap bead of polyurethane type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.08 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08 83 00
MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.

1.02 SUBMITTALS

- A. Section 01340 - Manufacturer's Drawings and Product Data: Submittal procedures.
- B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM) for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS).

1.04 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.05 WARRANTY

- A. See Section 01700 - Project Closeout, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Trulite Glass and Aluminum Solutions: www.trulite.com.
 - 2. Binswanger Mirror/ACI Distribution: www.binswangerglass.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass: ASTM C1036, Type 1 - Transparent Flat, Class 1 - Clear, Quality - Q1 (high-quality mirrors); silvering, protective coating, and quality requirements in compliance with ASTM C1503.
 - 1. Thickness: 1/4 inch.
 - 2. Size: 96 inch wide x 48 inch high nominal.

2.03 ACCESSORIES

- A. Channel Frame: One piece, channel frame, stainless steel, Type 430, satin finish, 1/2 inch by 1/2 inch by 3/8 inch deep with 90 degree mitered corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.
- C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install mirrors in accordance with GANA (TIPS) and manufacturers recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.04 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Clean mirrors and adjacent surfaces.

END OF SECTION

SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Fluid-applied flooring.
- B. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH) at all existing areas to receive new flooring.
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. General Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under General Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Shot blasting of all exposed aggregate floors.
- F. Special floor preparation at exposed aggregate floors

1.02 RELATED REQUIREMENTS

- A. Section 09 65 00 - Resilient Flooring.
- B. Section 09 65 66 - Resilient Athletic Flooring.
- C. Section 09 65 67 - Resilient Athletic Flooring - Gym
- D. Section 09 67 00 - Fluid Applied Flooring.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Unit Price for Alternate Flooring Adhesive: Do not include the cost of the alternate adhesive in the base bid; state on the bid form the unit price per square foot for using the alternate adhesive, in the event such remediation is required.
 - 1. Base the unit price on a total quantity of 5,000 square feet.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. Section 01310 - Construction Schedules, for submittal procedures.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Include certification of accuracy by authorized official of testing agency.
 - 7. Submit report to Architect.
 - 8. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.

1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by General Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. General Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
 - 6. Pay for testing.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 - 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present and above 90% RH; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Special Floor Coating at Exposed Aggregate Floors: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: 1/4 inch, maximum.
 - 2. If testing agency recommends any particular products, use one of those.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX SKM with ARDEX FEATHERFINISH: www.ardexamericas.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Preliminary cleaning.
 - 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 - 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Specified remediation, if required.
 - 6. Patching, smoothing, and leveling, as required.
 - 7. Other preparation specified.
 - 8. Adhesive bond and compatibility test.
 - 9. Protection.
- B. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
 - 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.
- C. Existing Exposed Aggregate Floor: Shot blast existing exposed aggregate floor.

3.03 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the General Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing. (Interior framing only.)
- C. Metal channel ceiling framing.
- D. Cementitious backer board.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 90 05 - Joint Sealers: Acoustic sealant.
- C. Section 09 51 00 - Acoustical Ceilings: Concealed suspension system.
- D. Section 09 90 00 - Paints and Coatings: Surface finishing.

1.03 SUBMITTALS

- A. Section 01310 - Construction Schedules, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.04 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 3 years of experience.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

1.06 COORDINATION

- A. Build openings and chases for heating, plumbing and electrical ducts, pipes and conduits into drywall partitions and ceilings as required. Consult other trades in advance and make provisions for their work to avoid cutting and patching. Coordinate installation of sheathing with cold-formed metal framing erector.

1.07 DELIVERY AND STORAGE

- A. Deliver materials to project site with manufacturer's labels intact and legible. Deliver fire-rated materials bearing testing agency label and required fire classification numbers. Store materials under cover in dry area, off floor. Damaged, deteriorated or wet materials shall be rejected and replaced.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Framing Connectors and Accessories:
 - 1. Same manufacturer as framing.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Refer to Stud Gauge Schedule at the end of this section for stud properties, sizes and gauges.
- D. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. "EQ" (Equivalent Gauge Thickness) Steel Studs and Runners: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 - 2010 (Approved February 2010, Effective March 1, 2010) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C645. The submission of a recognized evaluation report is acceptable to show conformance to this requirement.
 - a. Minimum Base-Metal Thickness: As indicated on the Drawings.
 - b. Traditional Flat Steel: Minimum Base-Metal Thickness: 0.018 inch.
 - c. Depth: As indicated on Drawings.
 - 2. Studs: "C" shaped with flat or formed webs .
 - 3. Runners: U shaped, sized to match studs.
 - 4. Ceiling Channels: C shaped.
 - 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- F. Concealed Suspension System: See Section 09 51 00 - Acoustical Ceilings.
- G. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.
 - 1. Products:
 - a. ClarkDietrich Building Systems; MaxTrak: www.clarkdietrich.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. CertainTeed Gypsum, Inc.: www.certainteed.com/gypsum.
 - 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 3. National Gypsum Company: www.nationalgypsum.com.
 - 4. USG Corporation: www.usg.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wallboard (Type III): Paper-faced gypsum wallboard as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - 4. Paper-Faced Products:
 - a. CertainTeed Gypsum, Inc.; CertainTeed Regular Gypsum Board.
 - b. Georgia-Pacific Gypsum; ToughRock.
 - c. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.

- d. USG Corporation; Sheetrock Brand Gypsum Panels.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Backing Board For Tile Areas (Type V):
- 1. "GREENBOARD" is PROHIBITED for use on this project.
 - 2. Application: Surfaces behind tile areas including shower ceilings and shower surrounds. Use for vertical and horizontal surfaces behind thin set tile.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 4. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 5/8 inch.
 - b. Products:
 - 1) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com.
 - 2) USG Corporation: www.usg.com.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
 - 5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Fire-Resistant Type: Type X core, thickness 5/8 inch.
 - b. Products:
 - 1) CertainTeed Gypsum, Inc.; DiamondBack GlasRoc Tile Backer.
 - 2) Georgia-Pacific Gypsum; DensShield Tile Backer.
 - 3) National Gypsum Company; Gold Bond eXP Tile Backer.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Acoustic Sealant: As specified in Section 07 90 05.
- B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Corner Beads: Durabead No. 103.
 - 3. Casing Beads: No. 200-A.
 - 4. Control Joints: Keene's No. 40.
 - 5. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
 - 6. Manufacturers - Finishing Accessories:
 - a. Same manufacturer as framing materials, unless otherwise indicated.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Sheathing Joint Tape: 4 inch minimum wide, rubberized asphalt-waterproofing element laminated to a 4-mil cross-laminated polyethylene film, 30 mil minimum total thickness. Provide product compatible with the weather barrier product to be installed, substantially equivalent to the following.
 - a. Product: 400 TWF manufactured by Polyguard Products, Inc.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 3. Ready-mixed vinyl-based joint compound.
- D. High Build Drywall Surfacers: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- E. Textured Finish Materials: Latex-based compound; plain.

- F. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.
- B. Commencement of installation signifies contractor acceptance of existing substrate.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.
 - 1. Laterally brace entire suspension system.
 - 2. Coordinate location of hangers with other work.
 - 3. Install ceiling framing to be independent of walls, columns and above ceiling work.
 - 4. Locate members within 6 inches of walls.
 - 5. Unless indicated otherwise, use 1-1/2 inch cold-rolled channels main framing (2 inch on double layer board) at 48 inches on center with furring channels run perpendicular at 16 inches on center.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing as scheduled on drawings.
 - 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Vertical.
 - 2. Spacing: As indicated.
- F. Furring for Fire Ratings: Install as required for fire resistance ratings indicated .
- G. Alternative to Blocking: Furnish and install heavy gage steel (12 gage x 6" wide) backer plates across face of metal studs for anchoring handrails, fixtures and grab bars at drywall partitions.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place continuous bead at perimeter of each layer of gypsum board.
 - 2. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, rough-in boxes, and access door frames.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- C. Tile Backer Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions. Install over layer of #15 felt in shower walls.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on interior walls and ceilings over 50 feet long.

2. At the heads of all door openings, aligned with door frame jambs, run continuous to top of gypsum board above ceiling. Use Keene's #093 or equal as control profile.
 3. At the heads of all door and window openings, aligned with jambs, run continuous to top of gypsum board above ceiling and from window sills continuous to floor. Use Keene's #093 or equal as control profile.
 4. At changes in back-up material.
 5. Control joint placement where shown on drawings shall take precedence over spacing limitations specified herein.
 6. Provide Fire resistant protections behind expansion/control joints in fire rated assemblies.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use fiberglass joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
 4. Level 0: Temporary partitions.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 3. Taping, filling and sanding is not required at base layer of double layer applications.
 4. At walls behind lockers, fully tape and bed all joints and fasteners.
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions .
- B. Texture Required: medium sand.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.09 STUD GAUGE SCHEDULE

- A. Conform to the following for determining Interior stud gauge based on maximum unbraced length.

INTERIOR STUD SCHEDULE

Depth	Spacing (max.)	Gauge (min.)	Max. Length Gyp. Two Sides	Max. Length Gyp. One Side
1 5/8"	16"	25 GA	9'-6"	8'-3"
2 1/2"	16"	25 GA	12'-6"	11'-0"
3 5/8"	16"	25 GA	16'-0"	14'-6"
6"	16"	25 GA	20'-0"	20'-0"

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2 1/2"	16"	20 GA	14'-0"	13'-0"
3 5/8"	16"	20 GA	18'-3"	17'-3"
4"	16"	20 GA	19'-6"	18'-9"
6"	16"	20 GA	26'-6"	25'-6"

1. At interior stud partitions with masonry veneer, use Manufacturer's Exterior Stud Schedule for gauge required at maximum height.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Acoustical sealant.
- B. Division 23 - Air diffusion devices in ceiling system.
- C. Division 26 - Light fixtures in ceiling system.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.
- C. Coordinate installation with other trades and make provisions for their work to prevent cutting and patching.

1.04 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: 100 sq ft of each type and size.

1.05 QUALITY ASSURANCE

- A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- D. Installer Qualifications: Company with three years minimum experience in similar sized installations.
- E. Certificates: Furnish certification of materials and systems conforming to specifications for flame spread and fire endurance rating requirements.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
 - 1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.
- B. Acoustical Tile Type I (Standard): Painted mineral fiber, ASTM E 1264 Type III, with the following characteristics:
 - 1. VOC Content: As specified in Section 01 61 16.
 - 2. Size: 24 x 24 inches and 24 x 48 inches.
 - 3. Thickness: 5/8 inches.
 - 4. Composition: Water felted.
 - 5. Density: 0.70 lb/cu ft.
 - 6. Light Reflectance: 0.83 percent, determined as specified in ASTM E1477.
 - 7. NRC Range: 0.50 to 0.60, determined as specified in ASTM C423.
 - 8. Ceiling Attenuation Class (CAC): 33 to 35, determined as specified in ASTM E1414.
 - 9. Edge: Square.
 - 10. Surface Color: White.
 - 11. Surface Pattern: Non-directional fissured.
 - 12. Product: 928 (24 x 24) Fine Fissured by Armstrong.

2.02 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.
 - 4. Products:
 - a. Chicago Metallic Corporation; Product 200: www.chicagometallic.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Fire-Rated Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Fire Rating: Listed and classified for use in a 1 hour fire-resistive assembly.
 - 4. Finish: White painted.
 - 5. Products:
 - a. Chicago Metallic Corporation; Product 250: www.chicagometallic.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- B. Hanger Wire: Minimum 12 gage, galvanized, self-annealed, mild steel wire.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Do not hang from fireproofing, fireproofing suspension members, bridging or roof decks. Locate first hanger 6 inches from wall and space 4'-0" along carrying channel. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Miter corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.05 ADJUSTING AND PATCHING

- A. Replace damaged members of exposed suspension system. Replace ceiling board and tile that is damaged, installed improperly, or shows visible signs of sagging.

3.06 CLEANING

- A. Clean soiled areas of ceiling material with mild soap and water. Replace ceiling board and tile damaged by improper cleaning.

3.07 GUARANTEE

- A. Guarantee the installation of the acoustical material to be tight and remain in place for two years after final acceptance of the building. Replace any loose or falling materials at no additional expense to the Owner. Replace ceiling tiles that become wet from warranty problems such as leaks or condensation at no additional expense to the Owner.

END OF SECTION

**SECTION 09 65 00
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Resilient LVT plank flooring.
- D. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- B. Section 01 23 00 - Alternates.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, 2 x 2 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 50 square feet of each type and color.
 - 3. Extra Wall Base: 20 linear feet of each type and color.

1.04 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Luxury Vinyl Tile: Surface-decorated, with wear layer, and:
 - 1. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 2. Tile Size: 24 by 24 inch.
 - 3. Plank Size: 8 by 48 inch.
 - 4. Total Thickness: 0.098 inch.
 - 5. Pattern: Directional and non-directional patterned.
 - 6. Manufacturers: Refer to drawings.
- B. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
 - 1. Size: 12 by 12 inch.
 - 2. Thickness: 0.125 inch.
 - 3. Pattern: As scheduled.
 - 4. Color: As scheduled.
 - 5. Manufacturers:
 - a. Armstrong World Industries, Inc.: www.armstrong.com

- b. Mannington Mills, Inc.: www.mannington.com
- c. Tarkett, Inc.: www.tarkett.com
- d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Height: 4 inch.
 - 2. Thickness: 0.125 inch thick.
 - 3. Finish: Satin.
 - 4. Length: Roll.
 - 5. Color: Color as selected from manufacturer's standards.
 - 6. Accessories: Premolded external corners and end stops.
 - 7. Manufacturers:
 - a. Burke Flooring; BurkeBase: www.burkeflooring.com.
 - b. Johnsonite, a Tarkett Company; Baseworks: www.johnsonite.com.
 - c. Roppe Corp; Wall Base: www.roppe.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Rubber.
 - 1. Resilient Flooring to Carpet:
 - a. Product: #152 manufactured by Burke.
 - b. Product: #CTA-XX-A manufactured by Johnsonite.
 - c. Product: #177 manufactured by Roppe.
 - 2. Resilient Flooring/Carpet to Ceramic Tile:
 - a. Product: #365 manufactured by Burke.
 - b. Product: #CE-XX-C with CDB-00-A manufactured by Johnsonite.
 - c. Product: #179 manufactured by Roppe.
 - 3. Resilient Flooring to Concrete Floor:
 - a. Product: #733 manufactured by Burke.
 - b. Product: #SSR-XX-B manufactured by Johnsonite.
 - c. Product: #168 manufactured by Roppe.
 - 4. Carpet to Concrete Floor:
 - a. Product: #230 manufactured by Burke.
 - b. Product: #EG-XX-K manufactured by Johnsonite.
 - c. Product: #157 manufactured by Roppe.
- D. Filler for Coved Base: Plastic.
- E. Sealer and Wax: Types recommended by flooring manufacturer.
- F. Metal divider strip equal to Klien Company 1/8" by 5/8" gauge L zinc divider strip.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.
- C. Tolerance: 1/8 in. in 10 ft.

- D. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- E. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- F. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- G. Verify that required floor-mounted utilities are in correct location.
- H. Beginning of installation means acceptance of existing substrate and site conditions.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is cured.
- D. Clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Apply only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
 - 1. Fill exposed joints that are not tight or that have gaps, such as around door frames, with sealant or replace flooring.
- I. Install at wall surface at reception counter and display walls.

3.04 TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.
- B. Remove and replace tile which have indication of 'bumps' or cracks caused by debris under the tile.
- C. Lay plank flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- D. Install tile pattern for 24" by 24" luxury vinyl tile as noted on drawings. Allow minimum 1/2 full size tile width at room or area perimeter.
- E. Lay tile starting at center of room working toward walls, square with room axis, in patterns as required. Tightly butt joints, true to line. Notify Architect of conflicts with patterns and tile sizes or layouts.
- F. Run flooring continuous into knee spaces in cabinetry or other openings under counters.

- G. At carpet to Resilient Flooring transitions or Resilient Flooring to ceramic tile floors, cut back Resilient Flooring to allow transition strip to adhere directly to substrate and abut the Resilient Flooring in a relatively flush manner.
- H. Install flooring in recessed floor access covers. Maintain floor pattern.
- I. Install feature strips and floor markings where indicated. Fit joints tightly.

3.05 INSTALLATION - BASE & TRIM

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.
- E. Furnish and install base at all millwork and casework, unless noted otherwise, including at all millwork and casework.
- F. Trim: Install transition trim on clean substrate. Bond tight to floor surface. Do not install with joints across doorway openings.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax in accordance with manufacturer's instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Protect flooring from damage and soiling until final acceptance by Owner.
- C. Replace any damage or unacceptable product at no cost to the Owner.

END OF SECTION

SECTION 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rubber sheet flooring, adhesively installed.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- B. Section 09 65 00 - Resilient Flooring.

1.03 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.
- D. Selection Samples: Manufacturer's color charts for flooring materials specified and game line paints, indicating full range of colors and textures available.
- E. Verification Samples: Actual flooring material specified, not less than 12 in square, mounted on solid backing.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.06 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

- A. Rubber Sheet Flooring: Rubber roll goods comprising rubber granules encapsulated in a zero-mercury polyurethane binder, lengths to avoid transverse seams.
 - 1. Thickness: Minimum 3/8 in.
 - 2. Sheet Width: Minimum 73 inches.
 - 3. Tensile Strength: Minimum 300 psi, per ASTM D412.
 - 4. Shore A Hardness: Minimum 75, per ASTM D2240.
 - 5. Color: As selected from manufacturer's standard range. One field color and one border color.
 - 6. Texture: Hammertone.
 - 7. Manufacturers:
 - a. Mondo Floor; Product: Sport Impact (10 mm); www.mondousa.com.
 - b. Robbins Sport Surfaces: Galaxy Fit; www.robbsfloor.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
- B. Adhesive: Water-resistant type recommended by flooring manufacturer for project conditions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Concrete: Verify that slab substrates are acceptable for installation of resilient flooring, in accordance with ASTM F 710. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.02 PREPARATION

- A. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- B. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations and approved shop drawings.
- C. Resilient Sheet Flooring:
 - 1. Unroll flooring and allow to relax before beginning installation.
 - 2. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.
 - 3. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
 - 4. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
 - 5. Weld seams using techniques and equipment recommended by manufacturer.
 - 6. Apply transparent top coat over flooring if recommended by manufacturer, to achieve a uniform finished appearance.

3.04 CLEANING

- A. Clean flooring using methods recommended by manufacturer.
- B. Remove all excess and waste material and leave installation in neat and clean condition.

3.05 PROTECTION

- A. Protect finished athletic flooring from construction traffic to insure that it is without damage upon completion of the work.

END OF SECTION

SECTION 09 65 67
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied polyurethane flooring over rubberized base mat.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- C. Section 09 65 00 - Resilient Flooring.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures. B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.
- D. Selection Samples: Manufacturer's color charts for flooring materials specified and game line paints, indicating full range of colors and textures available.
- E. Verification Samples: Actual flooring material specified, not less than 12 inch square, mounted on solid backing.
 - 1. Include samples of game lines, illustrating colors selected.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.06 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 FLUID-APPLIED ATHLETIC FLOORING

- A. Polyurethane Flooring Over Rubberized Base Mat:
 - 1. Total System Thickness: Minimum 9 mm.
 - 2. Base Mat: Prefabricated rubber mat of recycled rubber granules in polyurethane binder.
 - 3. Sealer: Manufacturer's standard two-component polyurethane compound designed to seal base mat before application of resin topcoat.
 - 4. Resin: Two-component, solid, pigmented, self-leveling polyurethane without fillers, zero mercury formulation, with properties as follows:
 - a. Tensile strength: Minimum 1000 psi, per ASTM D412.
 - b. Hardness: Minimum 70, when tested in accordance with ASTM D2240 using Type A durometer.

- c. Ultimate Elongation: Minimum 100 percent, per ASTM D412.
- 5. Finish: Manufacturer's standard pigmented two-component polyurethane topcoat, matte finish, in color as selected from manufacturer's standards. Allow for two colors.

2.02 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Concrete: Verify that slab substrates are acceptable for installation of resilient flooring, in accordance with ASTM F 710. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.02 PREPARATION

- A. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- B. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations and approved shop drawings.
- C. Fluid-Applied Polyurethane Flooring Over Base Mat:
 - 1. Mix components in strict accordance with manufacturer's written instructions, and apply at manufacturer's recommended rates. Allow sufficient curing time between coatings.
 - 2. Unroll base mat and allow to relax before beginning installation.
 - 3. Apply adhesive to substrate with notched trowel, and roll base mat into fresh adhesive. Do not allow compression fit at any seams. Roll mat with weighted linoleum roller immediately upon application of base mat and again after 45 minutes to insure that base mat is firmly adhered to substrate.
 - 4. Thoroughly mix and apply seal coat to surface of base mat with steel trowel.
 - 5. Apply resin wear layer in number of lifts recommended by manufacturer, applying wet-into-wet to achieve a seamless surface. Sand any imperfections in surface after wear layer has cured.
 - 6. Thoroughly mix and apply finish coat with airless sprayer to achieve uniform appearance.
 - 7. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.

3.04 CLEANING

- A. Clean flooring using methods recommended by manufacturer.
- B. Remove all excess and waste material and leave installation in neat and clean condition.

3.05 PROTECTION

- A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION

**SECTION 09 67 00
FLUID-APPLIED FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied flooring and base.
- B. Divider strips and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Joint between base and wall surface.

1.03 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available .
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 2 gallons of each color installed.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
- B. Supervisor Qualifications: Trained by product manufacturer, under direct full time supervision of manufacturer's own foreman.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.06 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F.
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
 - 1. Crossfield Products Corp.: www.crossfieldproducts.com.
 - 2. Key Resin Company: www.keyresin.com.
 - 3. Sherwin-Williams Company: www.protective.sherwin-williams.com.
 - 4. Sika Corporation: www.sikafloorusa.com.
 - 5. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 6. Dur-A-Flex Inc.: www.dur-a-flex.com.
 - 7. Stonhard: www.stonhard.com.
 - 8. TNEMEC: www.tnemec.com.
 - 9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Fluid-Applied Flooring Type II: Epoxy, two component, thermosetting, colored with mineral filler, with aggregate embedded in base coat.
 - 1. Product: Stonhard Stonshield SLT.
 - 2. Base Coat: 3/16 inch thick; color as selected.
 - 3. Aggregate: Small quartz chips, multiple colors as selected.
 - 4. Top Coat: Epoxy, two component, thermosetting; 1/16 inch thick; clear.
 - 5. Mildew Resistance: No growth.
 - 6. Color: Flagstone with medium texture.

2.03 ACCESSORIES

- A. Divider Strips: Zinc, 1/8 inch thick, height to match flooring thickness, with anchoring features; color as selected.
- B. Control Joint Strips: Match divider strips; 1/8 inch nominal width, 1/8 inch wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.
- C. Base Caps, and Separator Strips: Match divider strips, with projecting base of 1/8 inch.
- D. Cant Strips: Molded of flooring resin material.
- E. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- F. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
 - 1. Provide vapor control primer at all areas indicated to receive fluid applied flooring; type as recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.
- D. Verify that wood sub-floors have 12 percent maximum moisture content.
- E. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.
- F. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - STRIPS

- A. Accurately saw cut substrate to install divider strips.
- B. Install strips straight and level to locations indicated.
- C. Install access panel recess frames.
- D. Install cant strips at base of walls where flooring is to be extended up wall as base.

- E. Install base divider strips to match floor pattern. Install terminating cap strip at top of base; attach securely to wall substrate.

3.04 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness indicated.
- C. Finish to smooth level surface.
- D. Install flooring in recessed type floor access covers.
- E. Cove at vertical surfaces.

3.05 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until cured.

END OF SECTION

**SECTION 09 72 00
WALL COVERINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall covering .
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 90 00 - Painting: Preparation and priming of substrate surfaces.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive indicating compliance with specified requirements.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit two samples of each type of wall covering required, 7 x 9 inch in size illustrating color, finish, and texture.
- E. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.
- C. Surface Burning Characteristics Classification: Provide materials that meet classification ratings below: ASTM E84 (Flame Spread and Smoke Developed) II/B.
- D. Single Source Responsibility: Obtain tackable wallcovering system components from a single source.

1.05 MOCK-UP

- A. Provide panel, 4 panel drops wide, full height, illustrating installed wall covering and joint seaming technique.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.
- D. Deliver wall covering materials to job in sealed packages marked with pattern, name, product number and color legibly marked thereon.

1.07 FIELD CONDITIONS

- A. Install wallcoverings only when normal temperature and humidity conditions are approximately same conditions that will exist when building is occupied. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures between 60 degrees F and 85 degrees F for at least 10 days before and after application of finishes, unless required otherwise by manufacturer's instructions.

- B. Ventilation: Assure that adequate continuous ventilation is maintained as required for the various wallcoverings, sealers and adhesives used in spaces scheduled, as recommended by manufacturer for full drying or curing.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.
- D. Moisture Content: Shall be a maximum of 5% on new plaster, concrete, concrete masonry units and gypsum board when tested with an electronic moisture meter.
- E. Schedule installation with other construction activities to minimize the possibility of damage and soiling during the remainder of the construction period.

1.08 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Supply 20 linear feet of each color and pattern of wall covering; store where directed.
- C. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.09 PERFORMANCE STANDARDS

- A. Shall be protected by an acrylic resin top coating
- B. Color Retention:
 - 1. ASTM D 1308 "24 Hour Immersion Test" No color change after immersing for 24 hours in a solution of 75% bleach, 25% water.
 - 2. No color change after scrubbing with Isopropyl alcohol for 30 seconds, using a nylon bristle brush.
- C. Washability: CFFA-180 in accordance with ASTM-F793-93.
- D. Stain Resistance: No appreciable stain or discoloration after 24 hour exposure to mustard, lipstick, betadine, ballpoint pen and catsup, cleaned using Isopropyl alcohol.
 - 1. ASTM D 1308
 - 2. CCC-W-408D paragraph 4.4.
- E. Mildew Resistance: Growth rate of "0" as determined by ASTM-G21-90.
- F. Staphylococcus Aureus Resistance: ASTM G 2180 100% reduction with 24 hours.
- G. Scrubbability: CFFA-130

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Wall Covering Manufacturers:
 - 1. Koroseal/RJF International: www.koroseal.com.
 - 2. MDC Wallcoverings: www.mdcwall.com.
 - 3. National Wallcovering, Inc.: www.nationalwallcovering.com
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS - WALL COVERING

- A. Requirements for All Wall Coverings:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Vinyl Wallcovering shall be a polyvinyl chloride sheet adhered to a fabric backing. The vinyl wallcovering shall comply with requirements set forth in Division 01, and shall match the selected material in color range and/or appearance, depth of texture, and be equivalent to or exceed the quality, total weight, fabric backing, stain resistance, cleaning solution resistance, fire ratings and mildew resistance of the specified product(s) and comply with requirements of Contract Documents. Wallcovering to be 54" wide, manufactured in the U.S.A. and shall have a 5 year warranty
- B. Stipple, one color
 - 1. Total Weight: 20 oz. per lineal yard, minimum; 13.3 oz. per square yard, minimum; vinyl weight 10.8 oz. per square yard, minimum.

2. Type II - FS-CCC-W-408A; Category V - ASTM F-793; Mildew resistant and have antimicrobial additives to inhibit microbiological growth of staphylococcus aureus, escherichia coli, and aspergillus niger; No added Tedlar, Pre-Fixx or similar coating.
 3. Class A - ASTM E-84; Flame Spread and Smoke Development: 20 maximum.
 4. Fabric type: Osnaburg, 54" wide; Texture: Random Stipple, medium density.
 5. Equal to Koroseal "Desert Sand".
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
 - D. Termination Trim: Extruded plastic, clear.
 - E. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
 - F. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION - WALL COVERING

- A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.
- D. Commencement of wall covering installation constitutes acceptance of surfaces and conditions by the installer.

3.02 PREPARATION - WALL COVERING

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- E. Marks: Seal with shellac those that may bleed through surface finishes.
- F. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- G. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION - WALL COVERING

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Use wall covering in roll number sequence.
- C. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- D. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.
- E. Horizontal seams are not acceptable.
- F. Do not seam within 2 inches of internal corners or within 6 inches of external corners.
- G. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- H. Do not install wall covering more than 1/4 inch below top of resilient base.
- I. Cover spaces above and below windows, above doors, in pattern sequence from roll.
- J. Apply wall covering to electrical wall plates prior to replacing.

- K. Where wall covering tucks into reveals, or metal wallboard or plaster stops, apply with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.
- L. Install termination trim.
- M. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 FIELD QUALITY CONTROL

- A. Basis For Judging Defective Wall covering Materials:
 - 1. After hanging three strips, stop work and inspect wall covering for any defects such as color variance from strip to strip and roller marks.
 - 2. If material is acceptable, continue work. If not, do not proceed with application and contact wall covering supplier.
 - 3. Continuing of wall covering installation after three strips constitutes acceptance of wall covering by installer, and responsibility for performance and acceptability by Owner.
- B. Basis For Judging Defective Work:
 - 1. Loosening, sagging, falling, buckling, excessive shrinkage, warping, cracking, slipping, spotting, fading and open seams.
 - 2. Bubbles or wrinkles.
 - 3. Mismatching of seams.
- C. Responsibility of Defective Work: Installer shall bear responsibility of defective work and correct, to satisfaction of Architect, all defects or deficiencies in material or installation.

3.05 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. It is important to remove adhesive while wet.
- C. Reinstall wall plates and accessories removed prior to work of this section.

3.06 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.
- B. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation and finishing.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
 - 2. See Schedule - Colors, at the end of Section for Fire/Smoke Barrier Identification.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically so indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.
- E. See Schedule - Surfaces to be Finished, at end of Section.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 06 20 00 - Finish Carpentry.
- C. Division 08 - Doors and Windows; Primed metal surfaces to be finished; Wood doors with painted finish.
- D. Section 09 21 16 - Gypsum Board Assemblies: Tape and bedding of gypsum board.
- E. Section 09 72 00 - Wall Covering.

1.03 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content and Material Safety Data Sheets (MSDS).
- C. Samples: Submit two paper chip samples, 6 x 6 inch in size illustrating range of colors, lusters and textures available for each surface finishing product scheduled.
- D. Certification: Indicating contractor or renovation firm is EPA-certified, identifying certified on site staff, furnish evidence of worker training by certified staff and provide summary of lead-safe work practices to be implemented as required by 40 CFR 745.
- E. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures.
- G. Maintenance Data: Submit data including care and cleaning instructions, touch-up procedures, and repair of painted and coated surfaces.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. The intent of this specification is to produce the highest quality appearance of paint and finish surfaces. Employ skilled mechanics only. The proper preparation of all surfaces will be strictly enforced and wherever finished surfaces show any defects due to improper preparation, workmanship, etc., remove the defects and refinish the work at no additional expense to the Owner.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.
- C. Applicator Qualifications: Company specializing in commercial painting and finishing with minimum 3 years documented experience in projects of similar size and complexity.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame, fuel and smoke rating requirements for products and finishes.

1.07 MOCK-UP

- A. See Section 01400 - Quality Control, for general requirements for mock-up.
- B. Provide panel, 4 feet long by 4 feet wide, illustrating coating color, texture, and finish.
- C. Provide door and frame assembly illustrating coating color, texture, and finish.
- D. Locate where directed.
- E. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include 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. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- D. Store paints, oils, thinners and other flammable items outside the building wherever possible. When necessary to store inside, store in approved containers when not in actual use during painting activity.
- E. Take all necessary precautions to prevent fire hazards and spontaneous combustion.
- F. Take precautions to protect the public and construction workers during the progress of the work.
- G. Fire Extinguishers: Furnish temporary fire extinguishers of suitable chemicals and capacity, located at the storage area for painting and coating materials.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

- G. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless directed otherwise by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints, Primers, Block Fillers:
 - 1. Benjamin Moore & Co. (BM): www.benjaminmoore.com.
 - 2. PPG / Glidden Professional (Formerly ICI Paints): www.gliddenprofessional.com.
 - 3. Kelly-Moore Paint Co., Inc. (KM): www.kellymoore.com.
 - 4. Sherwin-Williams Company (SW): www.sherwin-williams.com.
- C. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Accessory materials such as linseed oil, turpentine and shellacs shall be first quality products of a reputable manufacturer.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best suited for intended operating environment" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of Texas.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Ferrous Metal:
 - 1. Primer: Alkyd resin base, rust inhibitive primer, white or off-white color, minimum 3 mils DFT.
 - a. BM P07-01 Universal Primer.

- b. PPG / Glidden Professional; Devco Coatings Devguard 4160 Multi-purpose Tank & Structural Primer.
 - c. KM #1711 Kel-Guard White Rust Inhibitive Primer.
 - d. Kwal / Comex UltraTech C309 Universal Water based primer.
 - e. Rust-Oleum 7400 Series High Solids Quick Dry Alkyd Primer.
 - f. SW Kem Kromik Universal Metal Primer #B50Z.
2. First Coat: Acrylic base first coat, minimum 1.3 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 184 Super Spec Exterior Satin or BM 449 Ultra Spec Exterior Satin.
 - b. PPG / Glidden Professional FORTIS® 350 Exterior Satin Paint 2402V.
 - c. KM #1250 Acry-Lustre Acrylic Semi-Gloss.
 - d. Kwal / Comex UltraTech C206 100% Acrylic semi-loss enamel.
 - e. Rust-Oleum Zinsser Perma White Exterior Mold & Mildew Semi Gloss Acrylic #3131.
 - f. SW A-100 Exterior Latex Satin House Paint #A82 series.
3. Top Coat: Acrylic base top coat, minimum 1.3 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 184 Super Spec Exterior Satin or BM 449 Ultra Spec Exterior Satin.
 - b. PPG / Glidden Professional FORTIS® 350 Exterior Satin Paint 2402V.
 - c. KM #1250 Acry-Lustre Acrylic Semi-Gloss.
 - d. Kwal / Comex UltraTech C206 100% Acrylic semi-loss enamel.
 - e. Rust-Oleum Zinsser Perma White Exterior Mold & Mildew Semi Gloss Acrylic #3131.
 - f. SW A-100 Exterior Latex Satin House Paint #A82 series.
- C. Galvanized Metal:
1. Primer: Acrylic based primer for galvanized surfaces, minimum 2.5 mils DFT.
- a. BM P04-01 Acrylic Metal Primer.
 - b. PPG / Glidden Professional; Devco Coatings Devguard 4160 Multi-purpose Tank & Structural Primer.
 - c. KM #1725 Kel-Guard Acrylic Metal Primer.
 - d. Kwal / Comex UltraTech C309 Universal Water based primer.
 - e. Rust-Oleum Zinsser Bulls Eye 123 WB Acrylic Primer #2001.
 - f. SW Pro Industrial Pro-Cryl Universal Acrylic Metal Primer #B66-310 Series.
2. First Coat: Acrylic base first coat, minimum 1.3 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 184 Super Spec Exterior Satin or BM 449 Ultra Spec Exterior Satin.
 - b. PPG / Glidden Professional FORTIS® 350 Exterior Satin Paint 2402V.
 - c. KM #1250 Acry-Lustre Acrylic Semi-Gloss.
 - d. Kwal / Comex UltraTech C206 100% Acrylic semi-loss enamel.
 - e. Rust-Oleum Zinsser Perma White Exterior Mold & Mildew Semi Gloss Acrylic #3131.
 - f. SW A-100 Exterior Latex Satin House Paint #A82 series.
3. Top Coat: Acrylic base top coat, minimum 1.3 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 184 Super Spec Exterior Satin or BM 449 Ultra Spec Exterior Satin.
 - b. PPG / Glidden Professional FORTIS® 350 Exterior Satin Paint 2402V.
 - c. KM #1250 Acry-Lustre Acrylic Semi-Gloss.
 - d. Kwal / Comex UltraTech C206 100% Acrylic semi-loss enamel.
 - e. Rust-Oleum Zinsser Perma White Exterior Mold & Mildew Semi Gloss Acrylic #3131.
 - f. SW A-100 Exterior Latex Satin House Paint #A82 series.

2.04 PAINT SYSTEMS - INTERIOR

- A. Wood:
1. Primer: Alkyd Enamel undercoat, minimum 2 mils DFT.
- a. BM C245-00 Super Spec Alkyd Undercoater.
 - b. PPG / Glidden Professional STAIN JAMMER® Alkyd Interior Primer Sealer 1110-1200.

- c. KM #985 Flo-Cote Enamel Undercoater.
 - d. Kwal / Comex 9200 Accu-Pro Duo Prime Ext Alkyd Primer.
 - e. Rust-Oleum Zinsser Cover Stain Alkyd Primer #3501.
 - f. SW ProBlock Interior Oil-Based Primer #B79W8810.
2. First Coat: Vinyl Acrylic first coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
 3. Top Coat: Vinyl Acrylic top coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
- B. Gypsum Board:
1. Primer: Vinyl acrylic primer/ sealer, minimum 1.1 mils DFT.
 - a. BM 253 Super Spec Latex Enamel Undercoater Primer Sealer.
 - b. PPG / Glidden Professional PVA Wall Interior Primer Sealer 1030-1200N.
 - c. KM #970 Acry-Plex Hi-Hide Vinyl Wall Sealer.
 - d. Kwal / Comex UltraTech C152 Interior Latex Primer-Sealer.
 - e. Rust-Oleum Zinsser Drywall Primer #1501.
 - f. SW ProMar 200 Latex Wall Primer #BB28W8200 Series.
 2. First Coat: Vinyl Acrylic first coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
 3. Top Coat: Vinyl Acrylic top coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
- C. Concrete / Concrete Block: (Only where indicated.)
1. Primer: Acrylic filler/ primer, minimum 8 mils DFT.
 - a. BM 206 Super Spec Interior Exterior High Build Block Filler.
 - b. PPG / Glidden Professional Concrete Coatings Block Filler Interior Exterior Primer 3010-1200.
 - c. KM #521 Acrylic Block Filler.

- d. Kwal / Comex UltraTech C302 Int/Ext 100% Acrylic Block Filler.
 - e. Rust-Oleum Zinsser Water Tite LV Masonry & Concrete Coating #5051
 - f. SW PrepRite Interior/Exterior Latex Block Filler #B25W25.
2. First Coat: Vinyl Acrylic first coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
 3. Top Coat: Vinyl Acrylic top coat, minimum 1.5 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM 276 Super Spec Interior Semi-Gloss Enamel or Ultra Spec N539 Semi-Gloss Enamel MPI # 43.
 - b. PPG / Glidden Professional; Ultra Hide 250 Interior Semi-Gloss Paint 1406N Series.
 - c. KM#1050 KM PROFESSIONAL Interior Acrylic Semi-Gloss Enamel.
 - d. Kwal / Comex UltraTech C119 Interior Latex semi-gloss.
 - e. Rust-Oleum Perma White Interior Mold & Mildew Semi Gloss Acrylic #2750.
 - f. SW ProMar 200 Zero VOC Interior Latex Semi-Gloss #B31W2600 series.
- D. Metal:
1. Primer: Alkyd resin base, rust inhibitive primer, white or off-white color, minimum 3 mils DFT.
 - a. BM P07 Universal Primer.
 - b. PPG / Glidden Professional; Devco Coatings Devguard 4160 Multi-Purpose Tank & Structural Primer.
 - c. KM #1711 Kel-Guard White Rust Inhibitive Primer.
 - d. Kwal / Comex UltraTech C309 Universal Water Based Metal Primer.
 - e. Rust-Oleum 7400 Series High Solids Quick Dry Alkyd Primer.
 - f. SW Kem Kromik Universal Metal Primer #B50Z.
 2. First Coat: Polyamide Epoxy first coat, minimum 3 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM P36/P36-84 Super spec HP Polyamide Epoxy.
 - b. PPG / Glidden Professional; Devco Coatings Tru-Glaze 4508 Chemical Resistant Epoxy Coating.
 - c. KM# 15 Chemical Mastic High Build Epoxy.
 - d. Kwal / Comex 3165 Accu-Guard Water Epoxy Polyamide.
 - e. Rust-Oleum 9100 Series Epoxy Mastic.
 - f. SW Tile-Clad High Solids Epoxy B62Z series.
 3. Top Coat: Polyamide Epoxy top coat, minimum 3 mils DFT, available in manufacturer's full range of tinted colors.
 - a. BM P36/P36-84 Super spec HP Polyamide Epoxy.
 - b. PPG / Glidden Professional; Devco Coatings Tru-Glaze 4508 Chemical Resistant Epoxy Coating.
 - c. KM# 15 Chemical Mastic High Build Epoxy.
 - d. Kwal / Comex 3165 Accu-Guard Water Epoxy Polyamide.
 - e. Rust-Oleum 9100 Series Epoxy Mastic.
 - f. SW Tile-Clad High Solids Epoxy B62Z series.
- E. Galvanized Metal:
1. Primer: Acrylic based primer for galvanized surfaces, minimum 2.5 mils DFT.
 - a. BM P04 Acrylic Metal Primer.
 - b. PPG / Glidden Professional; Devco Coatings Devguard 4160 Multi-Purpose Tank & Structural Primer.

- c. KM #1725 Kel-Guard Acrylic Metal Primer.
 - d. Kwal / Comex UltraTech C309 Universal Water Based Metal Primer.
 - e. Rust-Oleum Zinsser Bulls Eye 123 WB Acrylic Primer #2001.
 - f. SW Pro-Cryl Universal Acrylic Metal Primer #B66-310 Series.
2. First Coat (acrylic): Acrylic epoxy first coat, minimum 2.5 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 256/256-84-86 Catalyzed Acrylic Epoxy or Corotech V-341 Pre Catalyzed Waterborne Acrylic Epoxy.
 - b. PPG / Glidden Professional; Devoe Coatings Tru-Glaze-WB 4428 Waterborne Epoxy Coating.
 - c. KM# 7100 ENVIRA-POXY Water Reducible Epoxy.
 - d. Kwal / Comex 3170 Accu-Pro WB Catalyzed Acrylic Epoxy.
 - e. Rust-Oleum 5300 Water Borne Catalyzed Epoxy.
 - f. SW Pre-Catalyzed WaterBased Epoxy #K40-150 Series.
3. Top Coat (acrylic): Acrylic epoxy top coat, minimum 2.5 mils DFT, available in manufacturer's full range of tinted colors.
- a. BM 256/256-84-86 Catalyzed Acrylic Epoxy or Corotech V-341 Pre Catalyzed Waterborne Acrylic Epoxy.
 - b. PPG / Glidden Professional; Devoe Coatings Tru-Glaze-WB 4428 Waterborne Epoxy Coating.
 - c. KM# 7100 ENVIRA-POXY Water Reducible Epoxy.
 - d. Kwal / Comex 3170 Accu-Pro WB Catalyzed Acrylic Epoxy.
 - e. Rust-Oleum 5300 Water Borne Catalyzed Epoxy.
 - f. SW Pre-Catalyzed WaterBased Epoxy #K40-150 Series.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.
- D. Wood filler for transparent wood finishes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- 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.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster and Stucco: 12 percent.
 - 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 6. Concrete Floors and Traffic Surfaces: 8 percent.
- E. Beginning of coating application constitutes acceptance of surfaces and substrates.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Asphalt, Creosote, or Bituminous Surfaces to be Painted: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- K. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.
- L. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry. Contractor optional: utilize diamond grinder or other suitable mechanical method to remove laitance to accept coating.
- M. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- N. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent.
- O. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, 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. Prime paint entire surface; spot prime after repairs.
- P. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- Q. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- R. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- S. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- T. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.

- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance, finish and thickness. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- J. Prime with primer paint the back surfaces and surfaces in contact with concrete or concrete block of interior and exterior woodwork scheduled to be painted.
- K. Prime back surfaces and surfaces in contact with concrete or concrete block of interior woodwork scheduled to receive stain or varnish finish with glass varnish reduced 25 percent with mineral spirits.
- L. Edges of coating adjoining other materials or colors shall be sharp and clean with no overlapping.

3.04 FIELD QUALITY CONTROL

- A. See Section 01400 - Quality Control, for general requirements for field inspection.

3.05 CLEANING/TOUCH-UP

- A. As Work proceeds, promptly remove coating where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Spot painting will be allowed to correct soiled or damaged paint surfaces only when touch-up spot will blend into surrounding finish and is invisible to normal viewing. Otherwise, re-coat entire section to corners or visible stopping point.
- D. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

3.07 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically noted.
 - 2. Fire rating labels, equipment serial number and capacity labels, equipment names, identification, performance rating or nomenclature plates. Repair or replace identification markings on all equipment when painted accidentally.
 - 3. Stainless steel items.
 - 4. Copper, bronze, chromium plate, nickel, Monel metal, lead, and lead-coated copper, except as otherwise specified or scheduled.
 - 5. Face brick; prefinished wall materials, ceiling finish materials and floor coverings; items with factory applied final finish (except where exposed to view on roofs and in finished spaces).
 - 6. Items within generally inaccessible areas such as elevator shafts; crawl spaces; chases; plenums above suspended ceilings.

7. Operating parts, including moving parts of operating equipment such as valve and damper operators, linkages, sensing devices, motor and fan shafts.

B. Paint the surfaces described below under Schedule - Paint Systems.

3.08 SCHEDULE - PAINT SYSTEMS

A. Interior Finishes:

1. Wood - Semi-gloss finish: one coat primer, two coats latex (or) alkyd semi-gloss enamel for a total of 5 mils DFT minimum.
2. Gypsum Board - Eggshell finish: one coat primer/sealer, one coat wall texture, two coats latex eggshell paint for a total of 5.2 mils DFT minimum.
3. Gypsum Board - Semi-Gloss finish (typical finish): one coat primer/sealer, one coat wall texture, two coats latex semi-gloss enamel for a total of 5.2 mils DFT minimum.
4. Gypsum Board - Epoxy finish (at all restrooms and other wet areas, and other areas scheduled): one coat primer/sealer, two coats polyamide epoxy enamel (or) acrylic epoxy enamel for a total of 7.2 (or) 6.2 mils DFT minimum.
5. Concrete, Plaster and Concrete Block Masonry - Semi-gloss finish (typical finish): one coat block filler, two coats latex (or) alkyd semi-gloss enamel for a total of 11 mils DFT minimum.
6. Concrete and Concrete Block Masonry - Epoxy finish (at all restrooms and other wet areas, and other areas scheduled): one coat block filler, two coats polyamide epoxy enamel (or) acrylic epoxy enamel for a total of 14.0 (or) 13.0 mils DFT minimum.
7. Metal Items - Semi-gloss finish (Hollow metal framing, doors, equipment, handrails, etc.): one coat metal primer, two coats alkyd semi-gloss enamel for a total of 6.0 mils DFT minimum.
8. Galvanized Metal Items - Semi-gloss finish (exposed mechanical items, etc.): one coat galvanized metal primer, two coats alkyd semi-gloss enamel for a total of 6.0 mils DFT minimum.

B. Exterior Finishes:

1. Ferrous Metal items - semi-gloss or gloss finish: one coat alkyd metal primer, two coats High Performance acrylic semi-gloss or gloss enamel for a total of 4.7 mils DFT minimum.
2. Galvanized Metal items - semi-gloss or gloss finish: one coat acrylic metal primer, two coats High Performance acrylic semi-gloss or gloss enamel for a total of 4.7 mils DFT minimum.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs, Interior.
- B. Project Construction Sign.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry Systems.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 80 00 - Glazing.
- D. Section 09 21 16 - Gypsum Board Assemblies.

1.03 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, Braille, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.
- D. Inspect products upon receipt. Store products in manufacturer's packaging until ready for installation.

1.05 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide room number signs, room identification signs, and handicapped access symbol signs with raised characters to comply with the current applicable Accessibility Standards.

2.02 MANUFACTURERS

- A. Flat Signs:
 - 1. Best Sign Systems, Inc; Product Custom Design ADA Signs: www.bestsigns.com.
 - 2. Inpro : www.inprocorp.com.
 - 3. Mohawk Sign Systems, Inc: www.mohawksign.com.
 - 4. Seton Identification Products: www.seton.com/aec.
 - 5. A Sign of Quality, LLC: www.asoq.com.
 - 6. ASI Signs: www.asisignage.com.
 - 7. Bayuk Graphic Systems, Inc.: www.bayukgraphics.com.
 - 8. Casteel and Associates: www.casteelsign.com.
 - 9. MULTI-graphics Inc.: www.multigraphicsinc.com.
 - 10. National Signage Affiliates: www.nationalsignageaffiliates.com.
 - 11. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: All signs are required to comply with DOJ - ADA Standards, TAS and ANSI/ICC A 117.1 requirements and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Interior Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 3/4 inch.
 - 4. Sign Height: As scheduled, unless otherwise indicated.
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings .
 - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings .
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
 - 8. Rest Rooms: Identify with pictograms, the names "MEN", "WOMEN", "BOYS", "GIRLS", or "RESTROOM", room numbers to be determined later, and braille.
 - 9. Exit Doors and Stairs: Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs.

2.04 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Radiused.
 - 3. Wall Mounting of One-Sided interior Signs: Tape adhesive.
 - 4. Glass Mounting: Provide a blank sign panel of the same color and size as sign.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: As scheduled.
 - 4. Character Color: Contrasting color.

2.05 PROJECT CONSTRUCTION SIGNS

- A. Provide and install as indicated on the Drawings.
- B. Two 4 x 4 treated posts at each end of sign.

2.06 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Examine signage for defects prior to installation. Do not install damaged signage.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
 - 1. If no location is indicated obtain Owner's instructions.
- D. Placement of Signs:
 - 1. Room signs will be placed on the public side of the doorway except where noted otherwise.
 - 2. Room signs shall be placed on wall adjacent to the strike side of the door or opening, 9 inches minimum horizontally from the jamb to the centerline of the tactile characters and 48 inches minimum to 60 inches maximum above the floor to the baseline of the tactile characters.
- E. Attachment:
 - 1. Where sign placement requires attachment to glass, a blank sign panel of the same color and size shall be mounted to the opposite side of the glass to conceal adhesive attachment.

3.03 DAMAGE

- A. Any identifying device which is scratched or defaced will be rejected.
- B. Protect from damage until Substantial Completion; repair or replace damage items.

3.04 CLEANING

- A. Remove protective materials and clean all signs.
- B. Clean signs after installation as recommended by manufacturer.

3.05 SIGNAGE SCHEDULE

- A. Refer to the list of interior signs required for the project as attached to this Section.

END OF SECTION

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments (Room 127 and 128 only).

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.04 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall, floor, and ceiling supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit two samples of partition panels, 4 x 4 inch in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Accurate Partitions Corp.: www.accuratepartitions.com.
 - 2. Ampco Products, Inc: www.ampco.com.
 - 3. Columbia Partitions; www.psisc.com
 - 4. Global Toilet Partitions; www.globalpartitions.com
 - 5. Rockville Partitions; www.rockvillepartitions.com
 - 6. Scranton Products (Santanta/Comtec/Capital): www.scrantonproducts.com.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
 - 1. Colors: as selected from full range of all lines for doors, as selected from full range of all lines for panels.
 - 2. Texture: Orange Peel.
- B. Doors:
 - 1. Thickness: 1 inch.
 - 2. Width: 24 inch.
 - 3. Width for Handicapped Use: 34 inch, out-swinging.
 - 4. Height: 54 - 56 inch, manufacturers standard within this range.
- C. Panels:
 - 1. Thickness: 1 inch.
 - 2. Height: 54 - 56 inch, manufacturers standard within this range.
- D. Pilasters:
 - 1. Thickness: 1 inch.
 - 2. Width: As required to fit space; minimum 3 inch.

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with satin finish, 3 in high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow anodized aluminum, 1 x 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.
- C. Bottom Edging: Aluminum edging strips fastened to bottom edge of all doors and panels using vandal-proof stainless steel fasteners.
- D. Pilaster Brackets: Continuous type, Polished stainless steel.
- E. Wall Brackets: Continuous type, polished stainless steel.
- F. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- G. Hardware: Polished stainless steel:
 - 1. Continuous heavy duty hinges, gravity type, adjustable for door close positioning; one per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Maintain accessible toe clearance of 12 inches minimum between floor and lowest point of door or wall panels
- D. Attach panel brackets securely to walls using anchor devices.
- E. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- F. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.
- G. Floor Mounted Overhead Braced partitions:
 - 1. Attached pilasters to supporting floor with pilaster supports.
 - 2. Level, plumb, and tighten installation with leveling device.
 - 3. Secure pilaster shoes in position.
 - 4. Secure headrail to pilaster face with not less than two fasteners per face. Secure headrail to walls.
 - 5. Set tops of doors parallel with overhead brace when doors are in closed position.
- H. Wall-mounted Panels and Screens:
 - 1. Solidly attach to blocking in wall with anchoring devices and wall brackets.
 - 2. Position, level and tighten units.
- I. Toe Clearance:
 - 1. Provide 12 inches minimum clearance above the finish floor at all partition panels, including any bottom edging, and exclusive of partition support members.

2. Provide 6 inches deep minimum clearance beyond the compartment-side face of the front partition and at least one side partition, exclusive of partition support members, at wheelchair accessible compartments.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

**SECTION 10 28 00
TOILET ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms 127 and 128 only, and where Noted.
- B. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section in wall framing and plates and above ceiling framing.
- B. Section 10 21 13.19 - Plastic Toilet Compartments.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.04 SUBMITTALS

- A. See Section 01340 - Manufacturer's Drawings and Product Data for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Samples: Submit two samples of each accessory, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.
- E. Provide a schedule of locations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Toilet Accessories:
 - 1. AJW: ajw.com.
 - 2. American Specialties, Inc: www.americanspecialties.com.
 - 3. Bobrick Washroom Equipment: www.bobrick.com.
 - 4. Bradley Corporation: www.bradleycorp.com.
 - 5. Gamco (A Division of Bobrick): www.gamcousa.com.
 - 6. Substitutions: Section 01 60 00 - Product Requirements.
- B. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
 - 3. All operating features shall be able to operated with 5 lbs. of force or less to comply with accessibility requirements.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- G. Adhesive: Two component epoxy type, waterproof.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- E. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 TOILET ROOM ACCESSORIES

- A. Toilet Paper Dispenser: Single roll, surface mounted bracket type, chrome-plated zinc alloy brackets, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
 - 1. Product: B-273 manufactured by Bobrick.
- B. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock. (Room 127 and 128 and at noted sinks.)
 - 1. Minimum Capacity: 40 ounces.
 - 2. Product: B-2112 manufactured by Bobrick.
- C. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036. (Room 127, 128, and 132 only.)
 - 1. Size: per drawings.
 - 2. Frame: 0.05 inch channel shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
 - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
 - 4. Product: Series 165 manufactured by Bobrick.
- D. Grab Bars: Stainless steel, nonslip grasping surface finish. (Room 127 and 128 only.)
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length: 36 and 42 inches.
 - d. Length and Configuration: As indicated on drawings.
 - e. Products:
 - 1) B-6806 manufactured by Bobrick.
 - 2) Substitutions: Section 01 60 00 - Product Requirements.
- E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
 - 1. Product: B-254 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

Florence Recreation Center Renovation

- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 06 10 00 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.
- F. Confirm that rough openings are within the required heights for applicable code requirements for accessibility by persons with disabilities. Notify Architect of conflicts.
- G. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
- D. Locate accessories in order that they do not interfere with door swings or use of fixtures. Install recessed accessories after wall finishes have been completed. Where wall type does not allow for fully recessed condition, submit semi-recessed models instead.
- E. Anchor accessories with bolts, plates, and approved type fasteners. Take down any loose items and repair damaged wall surfaces. Only use expansion shield type anchors in masonry construction. In all other wall constructions, attach to pre-fabricated or solid lumber back-up plates.
- F. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

3.04 CLEANING

- A. Remove protective film from accessories immediately prior to final acceptance.
- B. Polish and clean all surfaces of the accessories.
- C. Replace any damaged items as directed by Architect.

END OF SECTION

SECTION 11 66 23
GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basketball backboards, goals, and support framing to be purchased and installed by Contractor.
- B. Volleyball sleeve floor plates to be purchased and installed by Contractor.
- C. Contractor shall confirm mounting locations on existing prestressed concrete beams.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.
- B. Section 09 65 67 - Resilient Athletic Flooring: Gymnasium flooring.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.
- C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.05 PROJECT CONDITIONS

- A. Coordinate size of access and route to place of installation.
- B. Coordinate equipment installation with size, location, and installation of service utilities.

PART 2 PRODUCTS

2.01 GYMNASIUM / ATHLETIC EQUIPMENT - GENERAL REQUIREMENTS

- A. See drawings for sizes and locations.
- B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
 - 1. National Federation of State High School Associations (NFHS) sports rules.
- C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of contract documents.
- D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
- E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.
- F. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.02 BASKETBALL

- A. Main Court Ceiling-Suspended Backstop Assemblies: Capable of mounting rectangular backboards. (Quantity of two.)
 - 1. Framing: Dual strut; rear folding framing.
 - 2. Folding Control System: Electric winch.
 - 3. Height Adjuster: To raise/lower assembly by 2 feet to adjust goal height.
 - 4. Height Control System: Manual winch.
 - 5. Framing Color: Manufacturer's standard white.
 - 6. Basis of Design: 90523 manufactured by Porter Athletic Equipment: www.porterathletic.com.

- B. Main Court Backboards: Tempered glass, rectangular shaped. (Quantity of two.)
 - 1. Frame: Brushed aluminum edge, steel mounting.
 - 2. Dimensions: 42 inches high by 72 inches wide
 - 3. Thickness: 1/2 inches.
 - 4. Markings: Integrally manufactured.
 - 5. Provide safety padding for bottom edge of backboard. Pad to be secured to backstop with glue and screws.
 - 6. Provide mounting kit.
 - 7. Color: Manufacturer's standard.
 - 8. Basis of Design: 00208-000 Pro Strut® Rectangular Glass Backboard manufactured by Porter Athletic Equipment: www.porterathletic.com.
- C. Side Court Backboards: Fiberglass, rectangular shaped. (Quantity of four.)
 - 1. Frame: Brushed aluminum edge, steel mounting.
 - 2. Dimensions: 42 inches high by 72 inches wide
 - 3. Thickness: 2 inches.
 - 4. Markings: Painted.
 - 5. Provide safety padding for bottom edge of backboard. Pad to be secured to backstop with glue and screws.
 - 6. Provide mounting kit.
 - 7. Color: Manufacturer's standard.
 - 8. Basis of Design: 00216-000 Model Fiberglass Rectangular Backboard manufactured by Porter Athletic Equipment: www.porterathletic.com.
 - 9. Installed on existing height adjusters to remain
- D. Goals: Steel rim, mounted to backboard, with attached nylon anti-whip net; complete with mounting hardware. (Quantity of six.)
 - 1. Net Attachment Device: Tube-tie.
 - 2. Finish: Powder coat orange.
 - 3. Provide two nets per goal.
 - 4. Basis of Design: 00223-000 Power Flex® Goal manufactured by Porter Athletic Equipment: www.porterathletic.com.

2.03 VOLLEYBALL

- A. Floor Sleeve latch cover for nets and goals; installed flush with finish floor surface. (Quantity of six.)
 - 1. Latch Cover: Brass, round; swivel hinge; tamper resistant lock with key.
 - 2. Round Pole Diameter: 3 1/2 inches.
 - 3. Basis of Design: Manufactured by Porter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
- B. Inspect areas and conditions before installation. Notify Architect in writing of unsatisfactory or detrimental conditions. Do not proceed until conditions have been corrected. Commencing installation constitutes acceptance of work site conditions.

3.02 INSTALLATION

- A. Install in accordance with contract documents and manufacturer's instructions.
- B. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.

- C. Install equipment rigid, straight, plumb, and level.
- D. Secure all equipment with manufacturer's recommended anchoring devices.
- E. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 ADJUSTING

- A. Verify proper placement of equipment.
- B. Verify proper placement of equipment anchors and sleeves. Use actual movable equipment to be anchored if available.
- C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration. Lubricate equipment if recommended by manufacturer.

3.04 PROTECTION

- A. Remove masking or protective covering from finished surfaces.
- B. Clean equipment in accordance with manufacturer's recommendations.
- C. Protect installed products until Substantial Completion.
- D. Replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics and operating features.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples: Submit two samples, minimum 1 inch long illustrating slat materials and finish, color, cord type and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.05 PROJECT CONDITIONS

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds, if required.
- B. Take field measurements to determine sizes required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Horizontal Louver Blinds:
 - 1. Bali Contract, division of Springs Industries, Inc.: www.swfcontract.com.
 - 2. Hunter Douglas: www.hunterdouglas.com.
 - 3. Levolor Contract: www.levolorcontract.com.
 - 4. SWFcontract, a division of Spring Window Fashions, LLC.: www.swfcontract.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BLINDS WITHOUT SIDE GUIDES

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand; complying with WCMA A100.1.
- C. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
 - 1. Width: 1 inch.
 - 2. Thickness: 0.008 inch.
 - 3. Color: As selected by Architect.
- D. Slat Support: braided polyester, ladder configuration.

- E. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
 - 1. Height: 1-1/2 inches.
 - 2. Color: Same as slats.
- F. Lift Cord: Braided polyester; continuous loop; complying with WCMA A100.1.
 - 1. Free end weighted.
- G. Control Wand: Extruded hollow plastic; hexagonal shape.
 - 1. Removable type.
 - 2. Length of window opening height less 3 inch.
 - 3. Color: Clear.
- H. Headrail Attachment: Wall and/or ceiling brackets as required by application.
- I. Accessory Hardware: Type recommended by blind manufacturer.

2.03 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/2 inch maximum.
- B. Fabricate blinds to cover window frames completely where not inset between frames.
- C. At openings requiring multiple blind units, provide separate blind assemblies with space of 1/2 inch maximum between blinds, located at window mullion centers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed. See Section 06 10 00.

3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.
- C. Place intermediate head supports at spacings recommended by manufacturer.

3.03 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.04 ADJUSTING

- A. Adjust blinds for smooth operation.

3.05 CLEANING

- A. Clean blind surfaces just prior to occupancy.

3.06 SCHEDULE

- A. At interior windows marked with a "B" to receive blinds.

END OF SECTION

SECTION 12 32 00
MANUFACTURED CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Cabinet hardware.
- D. Factory finishing.
- E. Preparation for installing utilities.

1.02 RELATED SECTIONS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 06 20 00 - Finish Carpentry.
- D. Section 08 80 00 - Glazing: Glass for casework.
- E. Section 09 65 00 - Resilient Flooring: Resilient Cove Base at cabinets.
- F. Division 22 - Plumbing: rough-ins and final connections.
- G. Division 23 - Mechanical: rough-ins and final connections.
- H. Division 26 - Electrical: rough-ins and final connections.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
 - 2. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
 - 3. Include certification program label.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Premium quality, unless other quality is indicated for specific items.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 75 percent of cost of woodwork for this Project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Manufacturer Qualifications: Member in good standing of the Architectural Woodwork Institute (AWI).

- D. Construction of casework and all equipment shall be within the requirements for accessibility as required in the Applicable Building Code, Texas Department of Licensing and Regulation "Elimination of Architectural Barriers" codes (TAS), and the Federal Americans with Disabilities Act (ADA). Standard accessible units or units modified to be accessible must comply with these codes. The successful Bidder shall be responsible to ensure compliance of all casework and equipment with all applicable codes.

1.05 MOCK-UP

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including doors, drawers, hardware and finishes.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.06 PATENT AND COPYRIGHT ITEMS

- A. The Contractor and/or his sureties shall indemnify and save harmless the Owner from any and all claims for infringement by reason the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

1.07 GUARANTEE

- A. This Contractor shall guarantee all materials and workmanship of equipment and casework provided in this contract for a minimum period of one year from date of substantial completion. Any defective materials or faulty workmanship occurring within that time shall be replaced or corrected promptly without charge upon notification by the Owner.

1.08 PRE-INSTALLATION MEETING

- A. Convene not less than one week before starting work of this section.

1.09 DELIVERY, STORAGE, AND PROTECTION

- A. Protect units from moisture damage.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. JC Millwork, Inc., Princeton, TX.
- B. Medco, Dallas, TX.
- C. TMI System Design Corporation, Dickinson, ND.
- D. Westmark Products Inc., Commercial Casework, Tacoma, WA.
- E. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 LUMBER MATERIALS

- A. Hardwood Lumber: NHLA; Graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Grade I/Premium; average moisture content of 5-10 percent; species as follows:
 - 1. Exposed Surfaces: Species Red Oak.
 - 2. Semi-Exposed Surfaces: Species Other hardwoods as approved.
 - 3. Concealed Surfaces: Species Other hardwoods as approved.
 - 4. All hardwood shall be free of stains, splits, shakes, season checks, and other similar defects.

2.03 PANEL MATERIALS

- A. Hardwood Faced Plywood: HPVA HP-1; graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, core of lumber; type of glue recommended for specific application; thickness as required; face veneer as follows:
 - 1. Exposed Surfaces: Grade AA, Birch, plain sliced, slip-matched.
 - 2. Semi-Exposed Surfaces: Grade A, others as approved, rotary cut, random-matched.
 - 3. Concealed Surfaces: Grade B, others as approved, rotary cut, random-matched.
- B. Combi-Core Hardwood Plywood: Provide panels constructed of veneer core inner plies with phenolic-bonded MDF crossbands; panel shall offer similar strength and stability to veneer core but shall have the void-free surface quality of PBC or MDF; panel shall provide excellent substrate for thin-sliced woods and rotary woods with face and back veneers laminated with formaldehyde-free technology.
 - 1. Columbia Forest Products: ClassicCore; www.columbiaforestproducts.com.
 - 2. Roseburg Forest Products: SkyPly FSC CFC Veneer Core; roseburg.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Particleboard: ANSI A208.1; medium density industrial type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, composed of wood chips bonded with interior grade adhesive under heat and pressure; sanded faces; thickness as indicated; use for components indicated on drawings.
- D. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.
 - 1. Use for painted components and concealed components.
 - 2. Use as backing for plastic laminate unless otherwise indicated.
- E. Plywood for Non-Decorative Purposes: NIST PS 1, Interior rated adhesives, core of wood plies from listed species unless otherwise indicated, thickness as indicated or as required by application.
 - 1. Concealed Surfaces: PS 1; APA A-B Grade, rotary cut Douglas fir face veneer.
- F. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S); use for drawer bottoms, dust panels, and other components indicated on drawings.

2.04 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Formica Corporation: www.formica.com.
 - 2. Nevamar Company: www.nevamar.com.
 - 3. Wilsonart International, Inc: www.wilsonart.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as indicated.
 - 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.05 COUNTERTOPS

- A. Plastic Laminate Countertops: Industrial grade particle board substrate covered with HPDL, conventionally fabricated, with decorative PVC edge.
 - 1. Provide moisture resistant substrate at locations where sinks, lavatories or other plumbing fixtures are indicated to be installed and at all contiguous countertop locations.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.
 - 2. Use at all exposed plywood edges.
 - 3. Use at all exposed shelf edges.
- C. Vinyl Countertop Edge: 3mm banding; edging in width to match thickness of countertop, color to match plastic laminate, used at locations as indicated.
- D. Glass: Type A as specified in Section 08 80 00.
- E. Fasteners: Size and type to suit application.
- F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- G. Concealed Joint Fasteners: Threaded steel.
- H. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.
- I. Concealed Support Brackets: For Countertops and glass shelves in display cases.

2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Product: 346ANO manufactured by Knape & Vogt.
- C. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Product: 85/185 Heavy Duty Double Slotted manufactured by Knape & Vogt.
- D. Drawer Pulls: "U" shaped wire pull, steel with satin finish, 3.5 inch centers.
 - 1. Product: 348235 manufactured by Stanley.
 - 2. For drawers over 24" wide, provide two (2) pulls.
- E. Cabinet Locks: Keyed cylinder master keyed, steel with satin finish.
 - 1. Product: DCN Series manufactured by Olympus Lock, Inc.
 - 2. All locks provided with two keys. All locks in a room to be keyed alike, and each room to be keyed differently. Provide two master keys per room and provide two master keys for all units on project.
- F. Catches: Magnetic.
 - 1. Product: SP-41/SP-45 manufactured by Stanley.
 - 2. Product: 1437 manufactured by Hager.
 - 3. Product: #592 manufactured by EPCO.
 - 4. Provide at the top of all cabinet doors that do not have spring catches.
 - 5. Provide at the approximate pull height, at underside of fixed shelf or on bulkhead if no shelf, of each door of tall cabinets.
- G. Bolt Keepers: Spring loaded, plated steel.
 - 1. Provide at the bottom of the fixed leaf of tall cabinets with double doors that have locks.

- H. Elbow Catch: Epco 1018-N.
 - 1. Provide at the top of the fixed leaf of base cabinets with double doors that have locks and at the bottom of the fixed leaf of upper cabinets with double doors that have locks.
- I. Standard Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 2. Static Load Capacity: Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Capacity: 200 lb base on an 18" slide length.
 - 6. Steel Ball Bearing type.
 - 7. Runners to have instant removal and stop to prevent inadvertent removal with positive closing action.
 - 8. Manufacturers:
 - a. Accuride International, Inc: www accuride.com.
 - b. Grass America Inc: www grassusa.com.
 - c. Knap & Vogt Manufacturing Company; Product 8400: www knapeandvogt.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- J. Flat File Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 2. Static Load Capacity: Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Capacity: 200 lb base on an 18" slide length.
 - 6. Mounting: Side, 1" maximum clearance.
 - 7. Steel Ball Bearing type.
 - 8. Runners to have instant removal and stop to prevent inadvertent removal with positive closing action.
 - 9. Manufacturers:
 - a. Accuride International, Inc: www accuride.com.
 - b. Grass America Inc: www grassusa.com.
 - c. Knap & Vogt Manufacturing Company; Product 8805: www knapeandvogt.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- K. Lateral File Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 2. Static Load Capacity: Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Capacity: 200 lb base on an 18" slide length.
 - 6. Mounting: Side, 1" maximum clearance.
 - 7. Steel Ball Bearing type.
 - 8. Runners to have instant removal and stop to prevent inadvertent removal with positive closing action.
 - 9. Manufacturers:
 - a. Accuride International, Inc: www accuride.com.
 - b. Grass America Inc: www grassusa.com.
 - c. Knap & Vogt Manufacturing Company; Product 8500: www knapeandvogt.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- L. File Hanger Rails:
 - 1. Manufacturers:
 - a. Kinetron Inc.; Product KHFB-500 with bar: www kinetron.biz
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - c. Provide configuration options for both letter- and legal-sized files.
 - d. Provide configuration options for both side-to-side and front-to-back orientations.

- M. Hinges: European style concealed type, steel with satin finish.
 - 1. Manufacturers:
 - a. 165°/170°- Blum Clip top 170* self-closing hinge 71T6540B OR Salice Series 200 165° self-closing hinge C2JFA99.
 - b. 120° hinge- Blum Clip top 120* self-closing hinge 71T5590B OR Salice Series 200 120° self-closing hinge C2J9A99.
 - c. 165-degree hinge typical, 120-degree hinge against wall locations.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Provide two hinges at doors 42" high or less, 3 hinges for doors up to 60" high and 4 hinges for doors over 60" high.
- N. Hanging rods: 1" dia. round plated steel tube with plated steel end supports and intermediate supports at 42" on center.
- O. Piano Hinges: No. 1496 nickel finish cut to full length of opening.
- P. Upper cabinet wall cleat: Anchor cleat at top of unit, nominal 3" wide x 3/4" thick x full length of unit.
- Q. Keyboard tray:
 - 1. Knapé & Vogt Manufacturing Company; Product Model SD-10-21, Keyboard and Mouse Tray: www.knapeandvogt.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- R. Coat Hooks: Epco Double Wardrobe Hook CH202-ZMN-2.

2.08 SHOP TREATMENT OF WOOD MATERIALS

- A. Provide UL approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.09 FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Drawer Construction Technique: Dovetail joints.
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Assemble units in the shop in as large components as practical to minimize field cutting and jointing. Mortise and tenon, glue and screw joints for maximum strength, ensuring square corners and plumb vertical surfaces.
- F. Shelves:
 - 1. All shelves shall be minimum 1" thick particleboard material.
 - 2. Shelves in cabinet with doors shall be finished both sides with cabinet liner in manufacturer's standard color. The front edge of the shelf shall be finished in matching laminate or PVC at manufacturer's option.
 - 3. Shelves in open cabinets shall be finished on all sides and edges with plastic laminate in colors as selected by Architect.
- G. Edging:
 - 1. Fit shelves, doors, and exposed edges with specified edging.
 - 2. Do not use more than one piece for any single length.
 - 3. Color to be selected from manufacturer's standard range.
- H. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
 - 1. Align adjoining units for site assembly modules, to achieve tight hairline joints.
 - 2. Prepare units with anchor devices to permit ease of site assembly.

- I. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- J. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
 - 1. Provide balance matched panels at each elevation.
 - 2. Provide sequence matching across each elevation.
- K. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.
- L. Shop glaze glass materials using the Interior Dry method specified in Section 08 80 00.

2.10 TYPICAL CABINET CONSTRUCTION

- A. Base Cabinets:
 - 1. All cases shall consist of two 3/4" thick particleboard end panels, full height from base to counter top. Top and bottom shall be 3/4" thick particleboard panels. Back panels shall be 1/2" thick particleboard, except in exposed locations where 3/4" thick particleboard back panels shall be used.
 - 2. All bases shall be separate and shall be framed using wood lumber at first floor and wood lumber at other floors to allow for a 3" deep (measured back from cabinet body face) x 4" high toe space. Close toe spaces at inside corners of cabinet intersections with material matching base framing.
 - 3. Cabinet doors shall be 3/4" thick particleboard. Provide locks as indicated by designations on the drawings.
 - 4. Drawer body shall be 1/2 inch thick solid lumber for drawers up to 6 inches in height, or 1/2 inch thick plywood with hardwood edges for drawers over 6 inches. Top edge of drawer body shall be slightly rounded. Bottom to be 1/4" hardboard, or 1/2" thick plywood. Applied drawer front shall be 3/4" particleboard. Provide locks as indicated by designations on the drawings.
 - 5. Vertical dividers shall be 3/4" thick particleboard, except where 1/4" thick hardboard is specifically called for in the drawings.
 - 6. Plastic Laminate Countertop substrate shall be 1 1/4" thick industrial grade particleboard, with splashes 3/4" thick x 4" high (unless noted otherwise). Provide sealant at all splashes or counter tops where they meet the wall or adjacent surfaces.
- B. Tall Cabinets:
 - 1. All cases shall consist of two 3/4" thick particleboard end panels, full height from base to top. Top and bottom shall be 3/4" thick particleboard panels. Back panels shall be 3/4" thick particleboard.
 - 2. All bases shall be separate and shall be framed using wood lumber at first floor and wood lumber at other floors to allow for a 3" deep (measured back from cabinet body face) x 4" high toe space. Close toe spaces at inside corners of cabinet intersections with material matching base framing.
 - 3. Cabinet doors shall be 3/4" thick particleboard. Provide locks as indicated by designations on the drawings.
 - 4. Drawer body shall be 1/2 inch thick solid lumber for drawers up to 6 inches in height, or 1/2 inch thick plywood with hardwood edges for drawers over 6 inches. Top edge of drawer body shall be slightly rounded. Bottom to be 1/4" hardboard, or 1/2" thick plywood. Applied drawer front shall be 3/4" particleboard. Provide locks as indicated by designations on the drawings.
 - 5. Vertical dividers shall be 3/4" thick particleboard, except where 1/4" thick hardboard is specifically called for in the drawings.
 - 6. Fixed shelf to be 1-inch-thick Combi-Core Hardwood Plywood.

7. Where the top of the cabinets do not extend to a ceiling or furr down above, provide and install horizontal filler closure at the cabinet top where fillers or scribes occur at the cabinet face. Horizontal filler shall extend between cabinet and wall or other cabinets.
- C. Wall Cabinets:
1. All cases shall consist of two 3/4" thick particleboard end panels, full height. Top and bottom shall be 3/4" thick particleboard panels. Back panels shall be 1/2" thick particleboard, except in exposed locations where 3/4" thick particleboard back panels shall be used.
 2. Cabinet doors shall be 3/4" thick particleboard. Provide locks as indicated by designations on the drawings.
 3. Vertical dividers shall be 3/4" thick particleboard, except where 1/4" thick hardboard is specifically called for in the drawings.
 4. Fabricate to allow for a minimum depth of 14 inches clear inside.
 5. Where the top of the cabinets do not extend to a ceiling or furr down above, provide and install horizontal filler closure at the cabinet top where fillers or scribes occur at the cabinet face. Horizontal filler shall extend between cabinet and wall or other cabinets.

2.11 FACTORY FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
 1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Sheen: Flat.
- E. Prime paint surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.
- C. Verify that surfaces, openings and conditions are ready to receive work of this section. Notify Construction Manager of any existing condition which will adversely affect execution. Beginning of installation will constitute acceptance of existing conditions.
- D. Verify field measurements against dimensions shown on approved shop drawings and correct any discrepancies.

3.02 PREPARATION

- A. Prime paint or seal concealed surfaces and items which will be in contact with cementitious materials or surfaces.
- B. Make field cuts to avoid splintering.

3.03 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- D. Visible fasteners shall have bright silver head and use bright silver grommets to protect laminate from cracking.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

- F. Secure cabinets and counter bases to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- H. Provide matching sealant where unit cases, countertops and splashes abut walls or adjacent surfaces.
- I. Cabinets and Shelves
 - 1. Set cabinets and shelves straight, plumb, and level. Adjust sub-tops within 1/16" of a single plane. Fasten each individual cabinet with not less than two fasteners into floor, where they do not adjoin other cabinets.
 - 2. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
 - 3. Provide holes and cutouts as required for mechanical and electrical service fixtures. Before making cutouts, drill pilot holes at corners. Cutouts shall be neat. Seal edges of cut material.
 - 4. Securely attach wall cabinets and shelves to solid supporting material, not plaster, lath or wallboard. Anchor, adjust, and align wall cabinets as specified above. Reinforcement of stud walls will be done previously based on initial drawings submitted by this contractor.
- J. Counter tops
 - 1. Field Jointing: Where practicable, make in same manners as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings so there is no job site processing of top and edge surfaces.
 - 2. Use concealed clamping devices for field joints, located within 6" of front, at back edges and at intervals not exceeding 24". Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Secure tops to base cabinets with "A" type fasteners or equivalent, using two or more fasteners at each front, end, and back.
 - 3. Abut top edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices.
 - 4. Provide holes and cutouts as required for mechanical and electrical service fixtures. Before making cutouts, drill pilot holes at corners. Cutouts shall be neat.
 - 5. No joints in plastic laminate shall be located within 2 feet of a sink cut-out.

3.04 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.05 PROTECTION

- A. Cover casework with 4-mil polyethylene film, for protection against soiling and deterioration during remainder of construction period.
- B. Advise Construction Manager of procedures and precautions for protection of materials and installed casework and equipment from damage by the work of other trades until acceptance of the work by the Owner.
- C. Repair or remove and replace defective work as required or directed.

3.06 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The Conditions of the Contract including the General Conditions, Supplementary Conditions, and Division One, apply to all work of this Division, whether attached or not.
- B. The requirements specified in this Section shall be applicable to work specified in other Sections within this Division.

1.02 SCOPE OF WORK

- A. All Division 22 sections of these specifications shall include all labor and material to complete the entire mechanical systems as specified and shown on the Drawings.
- B. All work shown and specified shall be completely installed and connected by mechanics properly qualified to perform the work required. All work shall be left in a satisfactory operating condition as determined by the Owner and Owner's Representative.
- C. Provide all services and perform all operations required in connection with, or properly incidental to, the construction of complete and fully operating systems with all accessories as herein specified and shown on the Drawings.
- D. Refer to "Conditions of Work" in Division 1

1.03 GENERAL

- A. The accompanying Drawings show diagrammatically the sizes and location of the various equipment items and the sizes of the major interconnecting piping and without showing exact details as to elevations, offsets, control lines, and other installation details. The Contractor shall carefully lay out his work to conform to the site conditions, to avoid obstructions and provide proper grading of lines. Exact locations of outlets, apparatus, and connections thereto shall be determined by reference to the Drawings, reviewed Shop Drawings, including equipment drawings, and rough-in drawings, by measurements at the building, and in cooperation with work specified in other sections of these specifications. Minor relocations necessitated by the conditions at the site or directed by the Architect shall be made without any additional cost to the Owner.
- B. These specifications and the accompanying Drawings are intended to describe and illustrate systems which will not interfere with the structures, which will fit into available spaces, and which will insure complete and satisfactorily operating installations. Contractor shall coordinate the proper fitting of all material and apparatus into the building and shall prepare larger scale installation drawings for all critical areas, areas with limited working clearances, and areas of significant congestion requiring a higher level of coordination illustrating the installation of work specified in Division 22 in relation to all other portions of work specified in other Sections of these Specifications. Interferences with other portions of work, or the building structure, shall be corrected before any work proceeds. Should changes become necessary on account of the failure of the Contractor to comply with these stipulations, Contractor shall make all necessary changes at no expense to the Owner.
- C. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted on the Drawings.

- D. It is the intent of the Contract Documents to provide an installation complete and operational in every respect. In the event that additional details or special construction may be required for work indicated or specified in this section, or work specified in other sections, it shall be the responsibility of the Contractor to provide same as well as to provide material and equipment usually furnished with such systems and required to complete the installation.
- E. Contractor sets forth that all personnel have the necessary technical training and ability; and that all work specified in this Division will be installed to the best standard of each trade, and will be complete and in good working order. If any of the requirements of the Drawings and specifications are impossible to perform, or if the installation when made in accordance with such requirements will not perform satisfactorily, report same to the Architect promptly after discovery of the discrepancy.
- F. No extra compensation will be allowed for extra work or changes caused by failure to comply with the above requirements.

1.04 EXAMINATION OF THE SITE

- A. Contractor shall visit the site, verify all items indicated on the Drawings or specified, and familiarize himself with the work conditions, hazards, grades, actual formations, soil conditions, points of connection, utility locations, and local requirements.
- B. Contractor shall take these conditions into consideration, and the lack of specific information on the Drawings shall not relieve the Contractor of any responsibility.
- C. All site visits shall be coordinated and scheduled with the Owner.

1.05 CUTTING AND PATCHING

- A. Excessive cutting of the building structure, walls, floors, ceilings, roof, etc., will not be permitted. No structural member shall be notched or cut unless specifically shown on the Drawings, or unless such cutting is authorized by the Architect.
- B. Provide for all holes or openings of proper size and shape as may be necessary for the proper installation of work specified in Division 22, consulting with the Architect regarding proper locations and sizes.
- C. Where deemed necessary, and after consulting with the Architect, perform all cutting and patching required for the installation of piping, etc. This shall include the cutting of concrete floors, concrete and tile floors, walls, ceilings, roofs, etc. It shall also include patching them as required to restore work to match existing finishes, following installation, testing, backfilling, insulation, etc.
- D. Holes through concrete shall be drilled with "Mole", "Core-It", or other diamond point hole saw.
- E. Refer to Division 01, Cutting and Patching.

1.06 CODE REQUIREMENTS

- A. Contractor is required to comply with the requirements of all National, State, and local codes and utility companies having jurisdiction. In no case does this relieve the Contractor of the responsibility of complying with the requirements of these specifications and Drawings where specified conditions are of higher quality than the requirements of the above specified offices. Where requirements of the specifications and Drawings are below the requirements of the above offices having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above offices and shall notify the Architect promptly.

- B. Contractor shall comply with the requirements and standards set forth by, but not limited to, the following:
1. (NFPA) National Fire Protection Association.
 2. (OSHA) Occupational Safety and Health Administration.
 3. (NEC) National Electric Code.
 4. (IECC) International Energy Conservation Code.
 5. Local Plumbing Code.
 6. Local Building Code.
 7. Local Fire Code.
 8. Local Energy Code.

Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction. Fees and costs incidental to these permits, inspections, and approvals must be assumed and paid by the Contractor.

1.07 RECORD DRAWINGS

- A. Contractor shall, during the execution of work, maintain a complete set of "Record Drawings" upon which all locations of equipment, ductwork, piping, and all deviations and changes in the work shall be neatly recorded for use in producing "As Builts" at Project Close- Out. This shall include the incorporation of all Supplemental Drawings issued during the Construction Period.
- B. All "Record Drawings" shall be reviewed monthly during the Construction Period, along with the monthly Pay Application Request.
- C. Refer to Division 01, Execution and Close-Out Requirements.

1.08 RECORDS AND INSTRUCTIONS FOR OWNER

- A. Accumulate during the job's progress the following sets, in triplicate, in accordance with the provisions of Division 01, Execution and Close-Out Requirements:
1. Warranties and guarantees and manufacturer's directions on equipment and material covered by the Contractor.
 2. Equipment and fixture brochures, wiring diagrams, and control diagrams.
 3. Copies of reviewed Shop Drawings, and material and equipment submittals. Copies of rejected submittals and Shop Drawings are not to be provided.
 4. Operating instructions for heating and other plumbing systems. Operating instructions shall include recommended maintenance and seasonal change-over procedures.
 5. Other data and drawings required during construction.
 6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
 7. Valve tag charts and diagrams specified elsewhere herein.
 8. "As-Built" Record Drawings shall be provided in electronic format on a CD (provide two (2) copies) in a PDF or DWG format as determined by the Owner.
 9. Provide copies of all City Inspection Certificates of Approval.
 10. Provide Contractor's Certification Statement that all equipment furnished and all work performed is in compliance with all applicable codes referenced in these specifications, or those which are currently in effect.
- B. Provide not less than one (1) day of operating instructions per building, during the adjustment and testing period, to the Owner's operating personnel in order to familiarize them with the proper care and operation of all equipment.
- C. All of the above data should be submitted to the Architect for approval at such time as the Contractor asks for his last payment request, just prior to his final payment request. In no

case will any portion of retainage be released until these documents are submitted and accepted.

- D. Refer to related portions of Division 1 for Project Close-Out requirements, Operation and Maintenance Data, Warranties, and other related certificates.

1.09 SHOP DRAWINGS AND SUBMITTALS

- A. Contractor shall submit to the Architect shop drawings, product submittals, and catalog data on all piping, equipment, and materials designated on the Drawings and specified herein. Electronic Pdf copies of each shall be submitted.
- B. Contractor shall submit full product data shop drawings and shall prepare and submit 1/4" = 1'-0" scale plumbing piping shop drawings. Contractor shall fully coordinate all piping shop drawings with sheet metal shop drawings and other trades. Failure to submit shop drawings in a timely manner, as required to keep pace with the construction and work of all other trades, will result in delays, and possible stoppage, of payment to the contractor. Additionally, no work may proceed until such shop drawings are submitted, reviewed, and found to be acceptable by the engineer.
- C. Each submittal will be reviewed for compliance with general requirements of design and arrangement only; it is not a contract document and acknowledgment of compliance does not relieve the Contractor from responsibilities for performance of the work in compliance with all provisions and requirements of the Contract Documents. Job measurements and the coordination of all dimensions for proper fit of all parts of the work and performance of all equipment supplied to meet specification requirements are, and remain, specific responsibilities of the Contractor.
- D. Shop Drawings shall be furnished by the Contractor for the work involved after receiving approval on the make and type of material and in sufficient time so that no delay or changes will be caused. This is done in order to facilitate progress on the job, and failure on the part of the Contractor to comply shall render him liable to stand the expense of any and all delays, changes in construction, etc., occasioned by his failure to provide the necessary detailed drawings. Also, if the Contractor fails to comply with this provision, the Architect reserves the right to go directly to the manufacturer he selects and secure any details he might deem necessary; and, should there be any charges in connection with this, they shall be borne by the Contractor.
- E. Shop Drawings submitted shall not consist of manufacturers' catalogues or tear sheets therefrom that contain no indication of the exact item offered. Rather, the submission on individual items shall designate the exact item offered and accessories as specified.
- F. Shop Drawings are not intended to cover detailed quantitative lists of valves, devices, fixtures, and similar items, as the Drawings and specifications illustrate those items; and it is the Contractor's responsibility to procure the proper quantities required to comply with the established requirements.
- G. Shop Drawings prepared to illustrate how equipment, piping, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified the conditions shown. Review by the Architect shall not relieve the Contractor of responsibility in the event the material cannot be installed as shown on those Shop Drawings.
- H. Various material submissions of such items as plumbing fixtures, drains, and other related items or accessories shall be assembled in brochures or in other suitable package form and shall not be submitted in a multiplicity of loose sheets. Cover sheets for each item submitted shall have sufficient bare space to allow for shop drawing review stamps.

- I. Contractor shall process his submitted data to insure that it conforms to the requirements of the Drawings and specifications, and there are no omissions and/or duplications.
- J. Shop Drawings and Submittals shall be accompanied by certification from the Contractor, and firm preparing such, that Shop Drawings have been checked for, and are in compliance with, the Contract Documents.
- K. All Submittals and Shop Drawings shall have been submitted for review by the Architect and Engineer within 90 days after Contract Award Date.

1.10 PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES

- A. Seal voids around pipes penetrating fire-rated assemblies and partitions using fire-stopping materials and methods in accordance with provisions in Section 07 84 00, Fire-Stopping.

1.11 DRAWINGS

- A. Drawings show diagrammatically the locations of the various pipes, fixtures, and equipment, and the method of connecting and controlling them. It is not intended to show every connection in detail and all fittings required for a complete system. The systems shall include, but are not limited to, the items shown on the drawings. Exact locations of these items shall be determined by reference to the general plans and measurements at the building, and in full cooperation with work specified in other Divisions of these specifications; and, in all cases, shall be subject to the approval of the Architect. The Architect reserves the right to make any reasonable change in the location of any of this work without additional cost to the Owner.
- B. Should any changes be deemed necessary in items shown on the Contract Drawings, the shop drawings, descriptions, and the reason for the proposed changes shall be submitted to the Architect for approval.
- C. Exceptions and inconsistencies in plans and specifications shall be brought to the Architect's attention prior to bids being submitted; otherwise, the Contractor shall be responsible for the cost of any and all changes and additions that may be necessary to accommodate the installation of any particular apparatus.
- D. Lay out all work maintaining all lines, grades, and dimensions according to these Drawings with due consideration for the work of others. Verify all dimensions at the site prior to any fabrication or installation. Should any conflict develop or installation be found impractical, the Architect shall be notified before any installation or fabrication, and the existing conditions shall be investigated and proper changes effected without any additional cost.
- E. Titles of Sections and Paragraphs in these specifications are introduced merely for convenience and are not to be construed as a correct or complete segregation or tabulation of the various units of materials and work. The Architect does not assume any responsibility, either direct or implied, for omissions or duplications by the Contractor due to real or alleged error in the arrangement of matter in the Contract Documents.

1.12 CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

- A. Equipment supplied as portions of work specified under other Divisions of these specifications shall be furnished with proper roughing-in diagrams and shall be installed as a part of Division 22.
- B. Furnish materials and labor required for the connection of this equipment.
- C. Contractor shall ascertain that all equipment so specified is included as part of this work.

1.13 COOPERATION

- A. Coordinate all work indicated in Division 22 with work specified in other Divisions to assure proper and adequate interface with other portions of the work.
- B. Maintain contact and be familiar with the progress of the general construction and the timely installation of sleeves and inserts, etc., before concrete is placed. Install the required systems in their several stages, at the proper time to expedite the work and avoid unnecessary delays in the progress of other portions of the work.
- C. Should any questions arise between work specified in Division 22 with respect to other portions of work specified in other Divisions of the Specifications, reference shall be made to the Architect for instructions.

1.14 MATERIALS AND EQUIPMENT

- A. All materials and equipment purchased shall be new. No used or reconditioned equipment will be allowed.
- B. All material shall be manufactured in the United States and/or shall comply with the North America Free Trade Agreement, NAFTA.
- C. Substitutions: Products of same functions, performance and design will only be considered if in full accordance with the requirements of Section 01 60 00, Product Requirements. The products of other manufacturers will be acceptable; only if, in the opinion of the Architect, the substitute material is of a quality as good or better than the material specified, and will serve with equal efficiency, maintainability, and dependability, the purpose for which the items specified were intended.
- D. Listed Manufacturers:
 - 1. Manufacturers listed in a product or system specification are those manufacturers considered capable of manufacturing products conforming to the specification requirements, and are listed therein to establish a standard.
 - 2. The "listing" of a manufacturer does not imply "acceptance" or "approval" of any standard product of that manufacturer.
 - 3. Products offered by listed manufacturers shall be equal to, or superior in all respects to, that specified by named products; and shall meet or exceed specification requirements.
 - 4. The description of specific qualities takes precedence over the reference standards and the description of qualities and reference standards together take precedence over the named product of listed manufacturers.
- E. Product Options:
 - 1. Products specified only by Reference Standards or by Description only means that any product meeting those standards or descriptions, by any manufacturer, will be considered.
 - 2. Products specified by naming several products or manufacturers means that only the manufacturers named will be considered.
 - 3. Products specified by naming only one product and manufacturer means that no option exists unless a substitution is accepted. Submit a request for substitution for any product or manufacturer not specifically named.
 - 4. Products specified by Description, Reference Standard, and naming several products or manufacturers means that any product and manufacturer named meeting those descriptions and standards will be considered. Submit a request for substitution for any product or manufacturer not specifically named.

- F. Limitations or Substitutions:
1. During Bidding Period, Instructions to Bidders, in Division 1, will govern times for submitting requests for substitutions under requirements specified in this Section.
 2. No later than ten (10) days prior to the bid date, Contractor shall notify the Architect in writing of any desired substitutions of products in place of those specified. These requests will be considered; and, if a favorable response is determined, this will be documented in the form of an Addenda.
 3. Substitutions will not be considered when indicated or implied on Shop Drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.
 4. Substitute products shall not be ordered or installed without written acceptance.
 5. Only one request for substitution for each product will be considered. If substitution is not accepted, Contractor shall provide specified product.
 6. Architect will determine acceptability of any and all substitutions.
- G. It is fully the Contractor's responsibility to assemble and submit sufficient technical information to fully illustrate that the material or equipment proposed for substitution is equal or superior, as the Architect is under no obligation to perform the service for the Contractor. The proposal shall be accompanied by manufacturer's engineering data, specification sheet, and a sample, if practical or if requested or specified. In no event shall a proposal for substitution be cause for delay of work. This shall include a detailed comparison to each product specification paragraph.
- H. Should a substitution be accepted under the above provisions, and should the substitution prove defective or otherwise unsatisfactory for the intended service, within the warranty period, the Contractor shall replace the substitution with the equipment or material specified, and on which the specifications required him to base his proposal.
- I. No substitutions will be considered contingent upon pending certification and rating agency approvals. Such certifications and ratings shall be in effect at the time of bidding.

1.15 EQUIPMENT SIZES AND REQUIREMENTS

- A. Space allocations in machinery and mechanical equipment spaces are based on equipment scheduled in each case. Should the Contractor request a substitution for equipment of another make that requires more space in any critical dimension, the Contractor shall submit, together with other submittal data on the equipment, prints of drawings indicating how the equipment may be installed, indicating room for servicing and revisions in piping or ducting and any other details necessary for the Architect to form a judgement as to the suitability of the substitute material, as to performance, suitability for the space and other variables.
- B. Duties of certain equipment items, horsepower of driving motors and electrical characteristics are scheduled for equipment items of a particular make in each case. Should requests for a substitute material be accepted which has other requirements that would involve allied equipment or other portions of work, the Contractor shall be responsible for all modifications required at no change in contract price. As examples:
1. If an accepted pump motor has a brake horsepower requirement above the motor horsepower scheduled, the Contractor shall be responsible for providing a larger motor and heavier drive and any change in size of the protective device, conduit run and conductors serving that motor. The latter shall be extended through an individual branch protective device and branch circuit on through the panel, feeder, feeder protective device, etc.

2. If accepted, water heaters having a different power voltage, phase or breaker size than those on which the heater were based, the Contractor shall be responsible for adjusting electrical service work accordingly.
- C. Structural steel members are indicated to provide supports for certain specific sizes and weights of equipment. Should a substitution request involve other equipment, the spacing of the supports shall be varied to suite the equipment. Should the weight or size of a proposed substituted item of equipment require additional supporting steel members, the Contractor shall include documentation of the additional supports in the request for substitution and install them at no change in contract price if the substitution is accepted.
- D. Various large apparatus to be installed may require that the apparatus be installed prior to the installation of portions of structural, walls, or door frames. Coordinate the installation of these items to insure that no demolition of general construction is necessary for equipment installation or that the apparatus does not have to be disassembled for installation.

1.16 STORAGE AND PROTECTION OF MATERIALS

- A. Store and protect materials and equipment as specified in Section 01 60 00, Product Requirements.
- B. Contractor shall provide storage space for protection and storage of his materials and assume complete responsibility for all losses due to any cause whatsoever. All storage shall be within the property lines of the building site, and as directed by the Architect. In no case, shall storage interfere with traffic conditions in any public or project thoroughfare.
- C. All work and material shall be protected at all times. Contractor shall make good any damage caused, either directly or indirectly, by his workmen. He shall be responsible for safe handling of all mechanical equipment and shall replace, without charge, all items damaged prior to acceptance by the Owner.
- D. On site storage shall not be inside the building during construction progress, but shall be in approved trailers or as specifically approved otherwise by the Architect. Storage inside the building shall only be allowed when so allowed by the Architect.

1.17 FOUNDATIONS

- A. Provide equipment foundations associated with the work specified in Division 22.
- B. All top corners and edges of all foundations shall be neatly chamfered at a one inch (1") high 45 degree angle.
- C. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch (1") below the equipment bases for alignment, leveling, and grouting with non-shrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up tight and the equipment shimmed, if necessary.
- D. After removal of the forms, the surface of the foundation shall be rubbed until smooth.
- E. Unless otherwise noted, foundations shall be four inches (4") thick for plumbing equipment, unless specifically noted otherwise on the Drawings.
- F. All concrete work shall conform to the requirements of Division 03, Cast-in-Place Concrete.
- G. Provide housekeeping pads and foundations for every item of floor mounted equipment specified in Division 22 specifications. Pads shall extend a minimum of two inches (2") in each direction beyond the equipment size.

1.18 EXCAVATION AND BACKFILLING

- A. Contractor shall do all necessary excavating and backfilling for the installation of his work. Trenches for underground piping shall be excavated to required depths with bell holes provided as necessary to insure uniform bearing. Care shall be taken not to excavate below depth, and any excavation below depth shall be refilled with sand or gravel firmly compacted. Where rock or hard objects are encountered, they shall be excavated to a grade six inches (6") below the lowermost part of the piping and refilled to grade as specified. Installation shall comply with ASTM D2321. After the piping has been installed and reviewed by Architect and local building authorities, trenches shall be backfilled to grade with approved non-expansive materials, well tamped or puddled compactly in place. Where streets, sidewalks, etc., are disturbed, cut, or damaged by this work, the expense of repairing same in a manner approved by Architect shall be a part of this contract.
- B. Contractor shall bear sole responsibility for design and execution of acceptable trenching and shoring procedures, in accordance with State of Texas Regulations. On trench excavations in excess of five feet (5') in depth, Contractor shall pay a qualified engineer to prepare detailed Drawings and specifications directing Contractor in the safe execution of trenching and shoring. It is understood that trench safety systems constitute a means and method of construction for which the Architect, Engineer, and Owner are not responsible. Accordingly, such documents when prepared, shall be separately issued by Contractor's Consultant, independent of project contract Documents.

1.19 WIRING

- A. Unless otherwise noted, all wiring for motors, starters, and equipment is specified in Division 26.
- B. Wiring of temperature controls shall be performed in accordance with the requirements of Division 26 but shall be performed as outlined in other sections of these specifications.
- C. All power for control circuits required for the Temperature Control System shall be provided and installed where indicated on the Division 26 Drawings, but shall otherwise be provided as indicated in other sections of these specifications.
- D. Each supplier of equipment requiring control shall have wiring diagrams furnished with submittals. This shall be used to determine conduit layouts required to complete the electrical portions of the instrumentation and control systems.
- E. All motors furnished as a portion of work specified in Division 22 shall be wired as specified in Division 26.
- F. Except where combination starter-disconnects are specified elsewhere herein or in Division 26, all motors shall be provided with safety disconnect switches in accordance with the National Electrical Code as specified in Division 26.
- G. Furnish all necessary wiring diagrams for equipment specified in Division 22, as a part of equipment submittals, for installation under other sections of these specifications.

1.20 EQUIPMENT STANDARDS

- A. All basic materials and equipment shall be standard catalog products of a reputable manufacturer and shall essentially duplicate equipment which has been in satisfactory service for at least one (1) year.
- B. First of a kind new technology devices will not be considered.
- C. Accessory equipment that is required to make a complete and functioning system that is not of the same manufacturer furnishing the basic materials or equipment shall carry the

guarantee of the basic material or equipment manufacturer and repair and replacement parts shall be available through normal trade channels locally.

1.21 CLEAN UP

- A. Contractor shall be responsible for cleaning up after and during all work performed under this Division of the Specifications.
- B. Contractor shall, on a daily basis, remove construction trash and debris accumulation to minimize the entrance of dust, dirt, and debris in piping, ductwork, and mechanical equipment.
- C. At the completion of construction, just prior to Substantial Completion and sustained operation of equipment, thoroughly clean the inside of piping, ductwork, and equipment.
- D. Refer to Division 1.

1.22 FINAL CONSTRUCTION REVIEW

- A. Schedule: Upon completion of the work specified in Division 22, there shall be a final construction review of the completed plumbing systems installations. Prior to this walk-thru, all work specified in this Division shall have been completed, tested, adjusted, and balanced in its final operating condition and the preliminary test report shall have been submitted to and approved by the Architect.
- B. Personnel: A qualified person representing the Contractor must be present at this final construction review to demonstrate the system and prove the performance of the equipment.
- C. Building plumbing systems shall have been in operation for a minimum of 15 days and Test and Balance work shall be substantially complete prior to this review.
- D. Exceptions to the aforementioned requirements will be considered on a case-by-case basis dependent on the size and type of project, as well as construction schedule limitations.

1.23 CERTIFICATIONS

- A. Before receiving final payment, the Contractor shall certify that all equipment furnished and all work done is in compliance with all applicable codes mentioned in these Specifications.
- B. Provide copies of all applicable approved notices and inspection certifications from the various inspections conducted by the Local Code Enforcement Authorities.

1.24 GUARANTEE

- A. The guarantee provision of this specification requires prompt replacement of all defective workmanship and materials occurring within one year of final job acceptance, Substantial Completion, or as defined by Extended Warranty Contracts. This includes all work required to remove and replace the defective item and to make all necessary adjustments to restore the entire installation to its original specified operating condition and finish at the time of acceptance.
- B. The Contractor shall also guarantee that the performance of all equipment furnished and installed under this Division of the Specifications shall be at least equal to the performance as called for in the specifications and as stated in the equipment submittals. Should there be indication that the equipment and installation is not producing the intended conditions, the Contractor shall make further tests as the Owner's Representative may direct to demonstrate that the equipment installed meets the specifications and is delivering the capacity specified or called for on the Drawings.

- C. If there is any indication that the equipment does not meet the specified quantities, the Contractor shall, at his expense, institute a program to demonstrate the adequacy of the installation. This program shall include all necessary testing and testing equipment. Should the Contractor not have the equipment or technical skill to perform the tests, it shall be his responsibility to employ recognized experts to perform the tests and shall provide certified laboratory tests, certified factory reports and work sheets, or other certified data to support results of any tests required.

END OF SECTION

SECTION 22 42 00

PLUMBING FIXTURES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Comply with Division 01 - General Requirements and referenced documents.
- B. Comply with Division 22 Sections, as applicable. Refer to other Divisions for coordination of work with other portions of the work.

1.02 SYSTEM DESCRIPTION

- A. Provide items of plumbing related equipment and accessories as indicated herein and as illustrated on the Drawings.

1.03 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 70 00.
- B. Indicate on submittal construction materials, finishes, sizes, quantities and related hardware.
- C. Product Data:
 - 1. Plumbing fixtures.
 - 2. Carriers.
 - 3. Fixture trim.
- D. Certification: Submit certification that completed system complies with test requirements of municipality, State, and other public authorities having jurisdiction over system.
- E. Provide closeout documents as required in Division 1, Section 01 70 00.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements in following order of precedence:
 - 1. Codes, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction over installation, inspection, and testing, including local codes.
 - 2. Provisions specified in this Section.
 - 3. International Plumbing Code.

1.05 HANDLING

- A. Deliver fixtures crated and in undamaged condition.
- B. Replace damaged fixtures with new fixtures.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

NOTE: The following manufacturers are considered acceptable, however, products submitted in lieu of specified item shall be equivalent to specified item as determined by the Architect and Engineer.

- A. Standard Plumbing Fixtures:
 - 1. Kohler.
 - 2. American Standard.
 - 3. Zurn.
 - 4. Sloan
- B. Carriers:
 - 1. Josam.
 - 2. Zurn.
 - 3. Wade.
 - 4. Jay R. Smith.
- C. Seats:
 - 1. Church.
 - 2. Beneke.
 - 3. Olsonite.
 - 4. Centoco.
- D. Faucets:
 - 1. T&S Brass.
 - 2. Zurn.
 - 3. Moen.
- E. Flush Valves:
 - 1. Sloan, "Sloan".
 - 2. Zurn, "Aqua-Flush Plus".
- F. Lead-Free Stop Valve in Hot and Cold Supply Lines to Each Fixture:
 - 1. Chicago.
 - 2. McGuire.
 - 3. T&S Brass.
 - 4. Engineered Brass Company.
- G. Stainless Steel Sinks:
 - 1. Elkay.
 - 2. Just.
 - 3. TABCO.
- H. Electric Water Coolers:
 - 1. Elkay

2.02 MATERIALS

- A. Fittings: Chrome plated heavy cast brass.
- B. Nipples: Extra heavy. Provide brass nipples or stainless steel nipples for domestic water systems including nipples at water heater & storage tank connection (no black steel nipples shall be allowed in domestic water systems).
- C. Plumbing Fixture Trim: Solid brass, including nuts and washers, handles, hold-down screws, valve bodies, swivel spouts, ferrules, sleeves, locknuts, and bushings.

- D. Piping Connections from Shutoff or Stop Valve to Fixture: Chrome plated brass pipe or chrome plated copper tubing.
- E. Floor and Wall Escutcheons: Chromium plated with set screws.
- F. Exposed Fixture Trimmings and Fittings: Chromium plated brass with polished, bright surfaces.
- G. Flush Valves: Non-hold open type, without seat bumpers.
- H. Traps: Chrome cast brass adjustable P-traps with cleanout.

2.03 DESIGN AND FABRICATION

- A. Plumbing fixture trims shall allow renewable operating units to be removed without detaching supply fitting or faucet.
- B. Fixtures, except water closets and urinals, shall have water supply above rim.
- C. Equip fixtures with supply discharge below rims with backflow preventers.
- D. Furnish angle stops, straight lock shield, loose-key pattern stops for supplies' and install with fixtures. Supplies shall be rigid, unless noted otherwise.
- E. Exposed traps and supply pipes for fixtures shall be connected to rough piping systems at wall.
- F. All plumbing trim and fixtures indicated on Drawings as handicap shall meet the current requirements of the Americans with Disabilities Act (ADA) and the Texas Accessibility Standards (TAS).
- G. Faucets, bubblers, & supply stops shall be National Sanitation Foundation (NSF) Standard 61, Section 9, compliant and listed for residential/drinking water use as required by the Federal Clean Water act effective January 1, 1997 in addition shall be Lead-Free per "Safe Drinking Water Act" U.S. Senate Bill S.3874.

2.04 PLUMBING FIXTURE SCHEDULE

A. WATER CLOSETS:

WC-1 - WATER CLOSET - WALL HUNG-FLUSH VALVE:

1. Kohler K-4325 "Kingston", wall hung siphon jet, elongated bowl, vitreous china with 1-1/2" top spud.
2. Flush valve: Sloan "Sloan" 111-YBYC, 1.28 GPF, polished chrome, externally adjustable, diaphragm type with 1" screwdriver angle stop, metal oscillating handle with sweat solder adaptor kit and cast wall flange with set screw.
3. Seat: Church 9400-SSC (5321.112) solid plastic, white, elongated, open front seat, less cover, combination check and self-sustaining hinges with stainless steel posts.
4. Support: Josam 12000 Series combination closet carrier and fitting. Provide back-to-back and single installations as job requires.
5. Mounting height (for student or adult) as directed by Architect.

WC-2 - WATER CLOSET - WALL HUNG-FLUSH VALVE – HANDICAP:

1. Same as specified for WC-1 water closet, except mount in compliance with ADA/TAS for handicapped use of primary user.
 2. Mounting height as directed by Architect.

U-1 - URINAL - HANDICAP:

1. Kohler K-ET "4904 Bardon", wall hung, siphon jet, vitreous china with 3/4" top spud, 14-1/2" elongated, flushing rim and 2" female outlet connection.

2. Flush valve: Sloan "Sloan" 186-0.5-YBYC, 0.5 GPF, polished chrome, externally adjustable, diaphragm type, with 3/4" screwdriver angle stop, metal oscillating handle with sweat solder adaptor kit and cast wall flange with set screw.
3. Support: Josam 17800 Series floor mounted carrier with bearing plate.
4. Mounting height as directed by Architect.

L-1 LAVATORY - WALL HUNG – TEMPERED WATER ONLY- HANDICAP:

1. Kohler K-1997-4 "Brenham", 20" x 18" vitreous china, "D" shaped bowl, self-draining deck with side and back splash, modified to comply with ADA front approach requirements, 4" faucet centers, punched for concealed arms.
2. Faucet/Strainer: T&S Brass B-0712—4DP-VF05, tempered water, adjustable time cycle, self-closing metering faucet chrome plated brass, 5" spout and 4" deck plate, ADA Compliant, vandalproof aerator with 0.5 gallon/cycle flow restriction. Provide wheelchair offset and Chicago 327-XCP perforated grid drain and wheelchair offset tailpiece for ADA front approach access. Provide with Leonard 170-LF thermostatic mixing valve.
3. Supplies: McGuire chrome riser supplies with loose key angle stops and chrome escutcheon plate with set screw.
4. Trap: McGuire 1-1/4" x 1-1/2", 17 gauge, chrome cast brass P-trap with cleanout plug and chrome escutcheon plate with set screw.
5. Support: Josam 17100 Series floor mounted carrier with concealed arms.
6. Insulate exposed water supplies and drain piping with ADA approved insulation kit, equal to Truebro "Lav-Guard" Kit No. 102 and 105.
7. Mounting height as directed by Architect.

EWC-1 - ELECTRIC WATER COOLER:

1. Same as EWC-2 except mounted at standard height.

EWC-2 - ELECTRIC WATER COOLER - BARRIER-FREE:

1. Elkay LMABF(VR)-8S, barrier-free wall hung electric water cooler with hermetically sealed, air cooled condensing unit with stainless steel receptor, self-closing anti-squirt bubbler volume regulator. Cooler shall deliver 8.0 GPH of 50 Deg.F. water at 90 Deg.F. ambient and 80 Deg.F. inlet water. Cabinet shall be satin stainless steel finish. Mount with bubbler as indicate on Architectural Drawings. Furnish accessory apron when units are mounted on an exposed wall as necessary to provide the ADA mandatory 27" maximum floor to underside clearance.
2. Support: Josam 17900 Series floor mounted carrier.
3. Supplies: McGuire chrome riser supply with wheel handle stop and chrome escutcheon plate with set screw.
4. Trap: McGuire 1-1/4" x 1-1/2", 17 gauge, chrome cast brass P-trap with cleanout plug and chrome escutcheon plate with set screw.

S-1 - GENERAL PURPOSE SINK (FRONT APPROACH):

1. Elkay LRAD-1918, single compartment, Type 302, 18 gauge stainless steel, 16" x 11-1/2" x 6-1/2" deep, self-rimming, sound deadened underside, faucet deck, 3 hole punch, 3-1/2" drain opening, off-set front-to-back ADA Compliant.
2. Faucet: T&S Brass B-2866-01-VRS-QT, bottom mount, cast brass valve body, rigid copper, 8" centers, gooseneck rigid spout, #317, 4" wrist blade lever vandal-resistant color coded chrome handles, quarter turn operating ceramic cartridge , ADA compliant, with vandalproof aerator.
3. Supplies: McGuire chrome riser supplies with wheel handle angle stops with chrome set screw escutcheon.
4. Tailpiece and Strainer: Dearborn Brass "Lucky 7 - L7T" stainless steel strainer drain with conical strainer basket and neoprene stopper, 1-1/2" o.d. off-set wheelchair chrome plated brass tailpiece.

5. Trap: McGuire 1-1/2" x 1-1/2", 17 gauge, chrome cast brass P-trap with cleanout plug, and chrome set screw escutcheon where exposed, 1-1/2" x 1-1/2" Schedule 40 PVC p-trap and cleanout plug where concealed.
6. Insulate exposed water supplies and drain piping with ADA approved insulation kit, equal to Truebro "Lav-Guard" Kit No. 102 and 105.
7. Mounting height as directed by Architect.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's printed instructions and drawings.
- B. Fasten fixtures secured to masonry walls or stud partitions with 1/4" brass toggle or through-bolts.
- C. Anchor inserts flush with finished wall and conceal when fixtures are mounted.
- D. Fixture Connections:
 1. Make connections between earthenware fixtures and flanges on soil pipe gas tight and watertight with closet-setting compound or with neoprene gasket and seal.
 2. Do not use natural rubber gaskets or putty for these connections.
 3. Bolts shall be not less than 1/4" diameter and shall be equipped with chromium plated nuts and washers.
 4. Set fixtures with outlet flanges required distance from floor or wall to make first class joint with gasket and fixture used.
- E. Refer to Architectural Drawings for all mounting heights and exact locations. Coordinate with General Contractor prior to starting any work, provide any additional supports, hangers, openings, etc. as required for a complete installation. Coordinate all clearances and locations with other trades as required.
- F. Provide stop valve in each hot and cold water supply line to each fixture.

3.02 KITCHEN EQUIPMENT; MILLWORK AND CASEWORK FIXTURES

- A. Furnish and install all sinks and other plumbing items shown on furniture, unless shown otherwise. Provide detailed information to the supplier of such furniture as to required cut-outs and drillings, so as to permit proper coordination during fabrication. Provide local shut-off valves in all supplied to such furniture. Provide all waste connections, including drains, p-traps and other materials, using sanitary materials corresponding to piping system material in each case.

3.03 FIXTURES FURNISHED UNDER THIS DIVISION

- A. Plumbing fixtures and equipment shall be set in place, leveled and connected as indicated on the drawings. Use china caps to conceal mounting bolts, and grout between all vitreous china fixtures and finished wall and floor surfaces with plaster of paris or portland cement.
- B. Install wall hung water closets, lavatories, urinals, sinks and electric water coolers on carriers.
- C. Do not install metal fittings until adjoining tile work has been acid- cleaned. The Mechanical Contractor shall be responsible for the proper protection of fixtures after installation.
- D. Connections to exposed plumbing fixtures shall be complete with chrome plated brass nipples, tubing, wall escutcheons, etc.

3.04 ADJUSTING AND CLEANING

- A. Prior to final acceptance of the work, Mechanical Contractor shall inspect all faucets, flush valves, stop valves, etc., to determine whether they operate properly and discharge proper quantities of water. Connect any deficiencies to satisfaction of Architect's representative.
- B. Thoroughly clean all plumbing fixtures, trim and accessories of all tape, adhesives and other foreign materials prior to final acceptance.

END OF SECTION

SECTION 23 00 00

HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) WORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work in this Division covers all HVAC work specified in all Division 23 Specification Sections and as illustrated on the HVAC Drawings. Comply with other Division 23 Specification Sections as applicable. Refer to other Divisions for coordination of work with other trades.
- B. Provide all labor, materials, equipment, transportation, tools and services, and perform all operations required for, and reasonably incidental to, the providing of mechanical system work described in this Division.
- C. Contractor shall include providing instructions and demonstrations of the operation of each installed system in its totality to the Owner. Refer to Division 23 specifications for specific Owner training requirements. As a minimum include training of the Owner's Operating Personnel on:
 - 1. Safety Shut-Down of HVAC Equipment.
 - 2. Sequence of HVAC Equipment Operation.
 - 3. Operation and Maintenance of all HVAC Equipment.
- D. The Conditions of the Contract, including the General Conditions and Supplementary Conditions, and Division 1 - General Requirements, apply to work covered by this section.
- E. Refer to Specification Section 01 32 16 for "Construction Progress Documentation".

1.02 RELATED DOCUMENTATION

- A. Section 01 60 00: Product Requirements.
- B. Section 01 70 00: Execution and Closeout Requirements.
- C. Section 01 78 00: Closeout Submittals.

PART 2 EXECUTION

NOT USED

PART 3 EXECUTION

3.01 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to Substantial Completion, fully instruct the Owner in the operation, adjustment, and maintenance of products, equipment, and systems; including, but not limited to all HVAC equipment, related accessories and components, temperature controls and the energy management system. Owner shall operate all systems in cooperation with Contractor for a period of at least five (5) working days prior to, or shortly after, Substantial Completion.
- B. Arrange for services of qualified manufacturer's representatives to fully instruct Owner on specialized portions of installations, such as air handling units and auxiliaries; units and automatic temperature controls.

- C. Arrange for each installer of equipment that requires regular maintenance to meet with Owner to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by trained manufacturer's representatives. Include detailed review of the following items:
 - 1. Operating and Maintenance Manuals.
 - 2. Record Documents.
 - 3. Spare Parts and Materials.
 - 4. Lubricants.
 - 5. Cleaning.
 - 6. Standard and Extended Warranties.
 - 7. Maintenance Requirements, Agreements, and similar continuing commitments.
- D. As a part of these instructions for operating equipment, demonstrate the following procedures:
 - 1. Start-Up.
 - 2. Shut-Down.
 - 3. General System Operating Instructions.
 - 4. Emergency Operating Conditions.
 - 5. Noise and Vibration Adjustments, where applicable.
 - 6. Safety Procedures.
 - 7. Economy and Efficiency Adjustments.
 - 8. Effective Energy Utilization.
- E. Return at first change of season for changeover from air conditioning to heating, or from heating to air conditioning, to demonstrate system operation in the opposite season.
- F. Submit a complete record of instructions as a part of maintenance instructions and the data book (Operations and Maintenance Manual) given to Owner. For each instructional period, supply the following data:
 - 1. Date of Instruction.
 - 2. System or Equipment Involved.
 - 3. Names of Persons Giving Instructions.
 - 4. Other Persons Present.
 - 5. Time Period (in hours/minutes) Instruction Provided.
- G. Amount of time to be devoted to instructional sessions shall be reasonable and consistent with the size and complexity of equipment and systems installed and as specified in other sections of these specifications.

3.02 SCHEDULE OF WORK

- A. Reference Division 1 for Additional Scheduling Information.
- B. Work under the various specification sections must be expedited and close coordination will be required in executing this work. Various system installers shall perform their portion of the work at such times as directed so as to insure meeting scheduled dates, and to avoid delaying the work of other trades. Owner's Representative will verify scheduled times of work in the various areas involved, each system installer shall cooperate in establishing these times and locations and the system installers shall process their work so as to insure proper execution and completion.
- C. Under no conditions shall any work be done in the present building that would interfere with its natural or intended use, unless special permission is granted by the Owner. This is particularly applicable where new connections are to be made to existing lines, services, or items of equipment in the present building or where existing equipment items or services in that building are to be replaced or modified in any way.

- D. Generally, modifications to, replacing of, or making new connections into existing service lines shall be accomplished only during the times directed by the Owner. New lines shall be installed and tested before connections are made into existing lines, meters, or services.
- E. All other modifications to existing piping systems and appurtenances, including necessary interconnections between old and new portions of the various systems, shall be accomplished at times scheduled so as not to interfere with the normal use of the building and the existing systems to which connection is to be made.
- F. The use of any type of fastening or hanging device which requires the use of shots or explosives of any nature shall not be used. Explosives shall also not be used for any excavation inside an existing building.
- G. Where required by conditions at the site, Contractor shall perform portions of work at night or at other such times as may be required to insure completion of work on schedule. No additional compensation to the Contractor will be paid for such work or required utilities.
- H. Contractor shall be available, as deemed necessary for job progress by the Owner, for weekly progress and coordination meetings with the Architect, Engineer, and other Owner's Representatives, when required. These meetings shall be used to monitor progress of submittals, receipt of materials, construction progress, cooperation of trades, field coordination by the Contractor, and to resolve unforeseen conditions in an expeditious manner. Failure to attend meetings, to respond in a timely manner to requests for information, or to progress at an acceptable pace to maintain the construction schedule shall constitute a delay by the Contractor and may be cause for assessment of fees to the Contractor as outlined in Division 1.
- I. Provide all temporary connections as necessary to facilitate the phasing of construction, even where not specifically shown. Where temporary work is required it may be required that the Contractor produce a Shop Drawing or field sketch to illustrate the intended methods which shall be submitted for approval by the Architect.

3.03 CLEAN UP

- A. Remove all debris, rubbish, and materials resulting from cutting, demolition, or patching operations from the work area on a daily basis.
- B. Where such work generates dust and debris take all precautions necessary to prevent dust and debris from accumulating in or on other mechanical and electrical equipment. This may require adding temporary filter media over ventilation air openings of certain types of equipment.
- C. At the conclusion of this work clean all building materials, mechanical equipment and electrical equipment so that all items are dust free and operating properly. Where dust causes damage to equipment the Contractor shall make repairs to this equipment at no cost to the Owner.
- D. Transport all demolished materials and equipment indicated above in approved containers and legally dispose of all debris off site in a manner approved by the Architect and Owner.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The Conditions of the Contract including the General Conditions, Supplementary Conditions, and Division One, shall apply to work of this Division, whether attached or not.
- B. The requirements specified in this Section shall be applicable to work specified in other Sections within this Division.

1.02 SCOPE OF WORK

- A. All Division 23 sections of these specifications shall include all labor and material to complete the entire mechanical systems as specified and shown on the Drawings.
- B. All work shown and specified shall be completely installed and connected by mechanics properly qualified to perform the work required. All work shall be left in a satisfactory operating condition as determined by the Owner and Owner's Representative.
- C. Provide all services and perform all operations required in connection with, or properly incidental to, the construction of complete and fully operating systems with all accessories as herein specified and shown on the Drawings.
- D. Refer to "Conditions of Work" in Division 1.

1.03 GENERAL

- A. The accompanying Drawings show diagrammatically the sizes and location of the various equipment items and the sizes of the major interconnecting piping and ductwork, without showing exact details as to elevations, offsets, control lines, and other installation details. The Contractor shall carefully lay out his work to conform to the site conditions, to avoid obstructions and provide proper grading of lines. Exact locations of outlets, apparatus, and connections thereto shall be determined by reference to the Drawings, reviewed Shop Drawings, including equipment drawings, and rough-in drawings, by measurements at the building, and in cooperation with work specified in other sections of these specifications. Minor relocations necessitated by the conditions at the site or directed by the Architect shall be made without any additional cost to the Owner.
- B. These specifications and the accompanying Drawings are intended to describe and illustrate systems which will not interfere with the structures, which will fit into available spaces, and which will insure complete and satisfactorily operating installations. Contractor shall coordinate the proper fitting of all material and apparatus into the building and shall prepare larger scale installation drawings for all critical areas, areas with limited working clearances, and areas of significant congestion requiring a higher level of coordination illustrating the installation of work specified in Division 23 in relation to all other portions of work specified in other Sections of these Specifications. Interferences with other portions of work, or the building structure, shall be corrected before any work proceeds. Should changes become necessary on account of the failure of the Contractor to comply with these stipulations, Contractor shall make all necessary changes at no expense to the Owner.

- C. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted on the Drawings.
- D. It is the intent of the Contract Documents to provide an installation complete and operational in every respect. In the event that additional details or special construction may be required for work indicated or specified in this section, or work specified in other sections, it shall be the responsibility of the Contractor to provide same as well as to provide material and equipment usually furnished with such systems and required to complete the installation.
- E. Contractor sets forth that all personnel have the necessary technical training and ability; and that all work specified in this Division will be installed to the best standard of each trade, and will be complete and in good working order. If any of the requirements of the Drawings and specifications are impossible to perform, or if the installation when made in accordance with such requirements will not perform satisfactorily, report same to the Architect promptly after discovery of the discrepancy.
- F. No extra compensation will be allowed for extra work or changes caused by failure to comply with the above requirements.

1.04 EXAMINATION OF THE SITE

- A. Contractor shall visit the site, verify all items indicated on the Drawings or specified, and familiarize himself with the work conditions, hazards, grades, actual formations, soil conditions, points of connection, utility locations, and local requirements.
- B. Contractor shall take these conditions into consideration, and the lack of specific information on the Drawings shall not relieve the Contractor of any responsibility.
- C. All site visits shall be coordinated and scheduled with the Owner.

1.05 CUTTING AND PATCHING

- A. Excessive cutting of the building structure, walls, floors, ceilings, roof, etc., will not be permitted. No structural member shall be notched or cut unless specifically shown on the Drawings, or unless such cutting is authorized by the Architect.
- B. Provide for all holes or openings of proper size and shape as may be necessary for the proper installation of work specified in Division 23, consulting with the Architect regarding proper locations and sizes.
- C. Where deemed necessary, and after consulting with the Architect, perform all cutting and patching required for the installation of piping, ductwork, etc. This shall include the cutting of concrete floors, concrete and tile floors, walls, ceilings, roofs, etc. It shall also include patching them as required to restore work to match existing finishes, following installation, testing, backfilling, insulation, etc.
- D. Holes through concrete shall be drilled with "Mole", "Core-It", or other diamond point hole saw.
- E. Refer to Section 01 70 00, Cutting and Patching.

1.06 CODE REQUIREMENTS

- A. Contractor is required to comply with the requirements of all National, State, and local codes and utility companies having jurisdiction. In no case does this relieve the Contractor of the responsibility of complying with the requirements of these specifications and Drawings where specified conditions are of higher quality than the requirements of the above specified offices. Where requirements of the specifications and Drawings are

below the requirements of the above offices having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above offices and shall notify the Architect promptly.

- B. Contractor shall comply with the requirements and standards set forth by, but not limited to, the following:
 - 1. (NFPA) National Fire Protection Association.
 - 2. (OSHA) Occupational Safety and Health Administration.
 - 3. (NEC) National Electric Code.
 - 4. (IECC) International Energy Conservation Code.
 - 5. Local Plumbing Code.
 - 6. Local Building Code.
 - 7. Local Mechanical Code.
 - 8. Local Fire Code.
 - 9. Local Energy Code.
- C. Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction. Fees and costs incidental to these permits, inspections, and approvals must be assumed and paid by the Contractor.

1.07 RECORD DRAWINGS

- A. Contractor shall, during the execution of work, maintain a complete set of "Record Drawings" upon which all locations of equipment, ductwork, piping, and all deviations and changes in the work shall be neatly recorded for use in producing "As Builts" at Project Close- Out. This shall include the incorporation of all Supplemental Drawings issued during the Construction Period.
- B. All "Record Drawings" shall be reviewed monthly during the Construction Period, along with the monthly Pay Application Request.
- C. Refer to Section 01 70 00, Execution and Close-Out Requirements.

1.08 RECORDS AND INSTRUCTIONS FOR OWNER

- A. Accumulate during the job's progress the following sets, in triplicate, in accordance with the provisions of Section 01 70 00, Execution and Close-Out Requirements:
 - 1. Warranties and guarantees and manufacturer's directions on equipment and material covered by the Contractor.
 - 2. Equipment and fixture brochures, wiring diagrams, and control diagrams.
 - 3. Copies of reviewed Shop Drawings, and material and equipment submittals. Copies of rejected submittals and Shop Drawings are not to be provided.
 - 4. Operating instructions for heating and cooling and other mechanical systems. Operating instructions shall include recommended maintenance and seasonal change-over procedures.
 - 5. Other data and drawings required during construction.
 - 6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
 - 7. "As-Built" Record Drawings shall be provided in electronic format on a CD (provide two (2) copies) in a PDF or DWG format as determined by the Owner.
 - 8. Provide copies of all City Inspection Certificates of Approval.
 - 9. Provide Contractor's Certification Statement that all equipment furnished and all work performed is in compliance with all applicable codes referenced in these specifications, or those which are currently in effect.

- B. Provide not less than one (1) hour of operating instructions, during the adjustment and testing period, to the Owner's operating personnel in order to familiarize them with the proper care and operation of all equipment.
- C. All of the above data should be submitted to the Architect for approval at such time as the Contractor asks for his last payment request, just prior to his final payment request. In no case will any portion of retainage be released until these documents are submitted and accepted.
- D. Refer to related portions of Division 1 for Project Close-Out requirements, Operation and Maintenance Data, Warranties, and other related certificates.

1.09 SHOP DRAWINGS AND SUBMITTALS

- A. Contractor shall submit to the Architect shop drawings, product submittals, and catalog data on all ductwork, equipment, and materials designated on the Drawings and specified herein. A minimum of eight (8) copies of each shall be submitted. Additional copies will be required when indicated by the Architect and as required for project coordination.
- B. Each submittal will be reviewed for compliance with general requirements of design and arrangement only; it is not a contract document and acknowledgement of compliance does not relieve the Contractor from responsibilities for performance of the work in compliance with all provisions and requirements of the Contract Documents. Job measurements and the coordination of all dimensions for proper fit of all parts of the work and performance of all equipment supplied to meet specification requirements are, and remain, specific responsibilities of the Contractor.
- C. Shop Drawings shall be furnished by the Contractor for the work involved after receiving approval on the make and type of material and in sufficient time so that no delay or changes will be caused. This is done in order to facilitate progress on the job, and failure on the part of the Contractor to comply shall render him liable to stand the expense of any and all delays, changes in construction, etc., occasioned by his failure to provide the necessary detailed drawings. Also, if the Contractor fails to comply with this provision, the Architect reserves the right to go directly to the manufacturer he selects and secure any details he might deem necessary; and, should there be any charges in connection with this, they shall be borne by the Contractor.
- D. Shop Drawings submitted shall not consist of manufacturers' catalogues or tear sheets therefrom that contain no indication of the exact item offered. Rather, the submission on individual items shall designate the exact item offered and accessories as specified.
- E. Shop Drawings are not intended to cover detailed quantitative lists of heating specialties, valves, air distribution devices, fixtures, and similar items, as the Drawings and specifications illustrate those items; and it is the Contractor's responsibility to procure the proper quantities required to comply with the established requirements.
- F. Shop Drawings prepared to illustrate how equipment, piping, ducts, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified the conditions shown. Review by the Architect shall not relieve the Contractor of responsibility in the event the material cannot be installed as shown on those Shop Drawings.
- G. Various material submissions of such items as air devices, plumbing fixtures, drains, and other related items or accessories shall be assembled in brochures or in other suitable package form and shall not be submitted in a multiplicity of loose sheets. Cover sheets for each item submitted shall have sufficient bare space to allow for shop drawing review stamps.

- H. Contractor shall process his submitted data to insure that it conforms to the requirements of the Drawings and specifications, and there are no omissions and/or duplications.
- I. Shop Drawings and Submittals shall be accompanied by certification from the Contractor, and firm preparing such, that Shop Drawings have been checked for, and are in compliance with, the Contract Documents.
- J. All Submittals and Shop Drawings shall have been submitted for review by the Architect and Engineer within 90 days after Contract Award Date.

1.10 PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES

- A. Seal voids around ducts and pipes penetrating fire-rated assemblies and partitions using fire-stopping materials and methods in accordance with provisions in Section 07 84 00, Fire-Stopping.

1.11 DRAWINGS

- A. Drawings show diagrammatically the locations of the various pipes, ductwork, fixtures, and equipment, and the method of connecting and controlling them. It is not intended to show every connection in detail and all fittings required for a complete system. The systems shall include, but are not limited to, the items shown on the drawings. Exact locations of these items shall be determined by reference to the general plans and measurements at the building, and in full cooperation with work specified in other Divisions of these specifications; and, in all cases, shall be subject to the approval of the Architect. The Architect reserves the right to make any reasonable change in the location of any of this work without additional cost to the Owner.
- B. Should any changes be deemed necessary in items shown on the Contract Drawings, the shop drawings, descriptions, and the reason for the proposed changes shall be submitted to the Architect for approval.
- C. Exceptions and inconsistencies in plans and specifications shall be brought to the Architect's attention prior to bids being submitted; otherwise, the Contractor shall be responsible for the cost of any and all changes and additions that may be necessary to accommodate the installation of any particular apparatus.
- D. Lay out all work maintaining all lines, grades, and dimensions according to these Drawings with due consideration for the work of others. Verify all dimensions at the site prior to any fabrication or installation. Should any conflict develop or installation be found impractical, the Architect shall be notified before any installation or fabrication, and the existing conditions shall be investigated and proper changes effected without any additional cost.
- E. Titles of Sections and Paragraphs in these specifications are introduced merely for convenience and are not to be construed as a correct or complete segregation or tabulation of the various units of materials and work. The Architect does not assume any responsibility, either direct or implied, for omissions or duplications by the Contractor due to real or alleged error in the arrangement of matter in the Contract Documents.

1.12 CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

- A. Equipment supplied as portions of work specified under other Divisions of these specifications shall be furnished with proper roughing-in diagrams and shall be installed as a part of Division 23.
- B. Furnish materials and labor required for the connection of this equipment.

- C. Contractor shall ascertain that all equipment so specified is included as part of this work.

1.13 COOPERATION

- A. Coordinate all work indicated in Division 23 with work specified in other Divisions to assure proper and adequate interface with other portions of the work.
- B. Maintain contact and be familiar with the progress of the general construction and the timely installation of sleeves and inserts, etc., before concrete is placed. Install the required systems in their several stages, at the proper time to expedite the work and avoid unnecessary delays in the progress of other portions of the work.
- C. Should any questions arise between work specified in Division 23 with respect to other portions of work specified in other Divisions of the Specifications, reference shall be made to the Architect for instructions.

1.14 MATERIALS AND EQUIPMENT

- A. All materials and equipment purchased shall be new. No used or reconditioned equipment will be allowed.
- B. Substitutions: Products of same functions, performance and design will only be considered if in full accordance with the requirements of Section 01 60 00, Product Requirements. The products of other manufacturers will be acceptable; only if, in the opinion of the Architect, the substitute material is of a quality as good or better than the material specified, and will serve with equal efficiency, maintainability, and dependability, the purpose for which the items specified were intended.
- C. Listed Manufacturers:
 - 1. Manufacturers listed in a product or system specification are those manufacturers considered capable of manufacturing products conforming to the specification requirements, and are listed therein to establish a standard.
 - 2. The "listing" of a manufacturer does not imply "acceptance" or "approval" of any standard product of that manufacturer.
 - 3. Products offered by listed manufacturers shall be equal to, or superior in all respects to, that specified by named products; and shall meet or exceed specification requirements.
 - 4. The description of specific qualities takes precedence over the reference standards and the description of qualities and reference standards together take precedence over the named product of listed manufacturers.
- D. Product Options:
 - 1. Products specified only by Reference Standards or by Description only means that any product meeting those standards or descriptions, by any manufacturer, will be considered.
 - 2. Products specified by naming several products or manufacturers means that only the manufacturers named will be considered.
 - 3. Products specified by naming only one product and manufacturer means that no option exists unless a substitution is accepted. Submit a request for substitution for any product or manufacturer not specifically named.
 - 4. Products specified by Description, Reference Standard, and naming several products or manufacturers means that any product and manufacturer named meeting those descriptions and standards will be considered. Submit a request for substitution for any product or manufacturer not specifically named.

- E. Limitations or Substitutions:
1. During Bidding Period, Instructions to Bidders, in Division 1, will govern times for submitting requests for substitutions under requirements specified in this Section.
 2. No later than ten (10) days prior to the bid date, Contractor shall notify the Architect in writing of any desired substitutions of products in place of those specified. These requests will be considered; and, if a favorable response is determined, this will be documented in the form of an Addenda.
 3. Substitutions will not be considered when indicated or implied on Shop Drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.
 4. Substitute products shall not be ordered or installed without written acceptance.
 5. Only one request for substitution for each product will be considered. If substitution is not accepted, Contractor shall provide specified product.
 6. Architect will determine acceptability of any and all substitutions.
- F. It is fully the Contractor's responsibility to assemble and submit sufficient technical information to fully illustrate that the material or equipment proposed for substitution is equal or superior, as the Architect is under no obligation to perform the service for the Contractor. The proposal shall be accompanied by manufacturer's engineering data, specification sheet, and a sample, if practical or if requested or specified. In no event shall a proposal for substitution be cause for delay of work. This shall include a detailed comparison to each product specification paragraph.
- G. Should a substitution be accepted under the above provisions, and should the substitution prove defective or otherwise unsatisfactory for the intended service, within the warranty period, the Contractor shall replace the substitution with the equipment or material specified, and on which the specifications required him to base his proposal.
- H. No substitutions will be considered contingent upon pending certification and rating agency approvals. Such certifications and ratings shall be in effect at the time of bidding.

1.15 EQUIPMENT SIZES AND REQUIREMENTS

- A. Space allocations in machinery and mechanical equipment spaces are based on equipment scheduled in each case. Should the Contractor request a substitution for equipment of another make that requires more space in any critical dimension, the Contractor shall submit, together with other submittal data on the equipment, prints of drawings indicating how the equipment may be installed, indicating room for servicing and revisions in piping or ducting and any other details necessary for the Architect to form a judgement as to the suitability of the substitute material, as to performance, suitability for the space and other variables.
- B. Duties of certain equipment items, horsepower of driving motors and electrical characteristics are scheduled for equipment items of a particular make in each case. Should requests for a substitute material be accepted which has other requirements that would involve allied equipment or other portions of work, the Contractor shall be responsible for all modifications required at no change in contract price. As examples:
1. If an accepted A/C Unit has a brake horsepower requirement above the motor horsepower scheduled, the Contractor shall be responsible for providing a larger motor and heavier drive and any change in size of the protective device, conduit run and conductors serving that motor. The latter shall be extended through an individual branch protective device and branch circuit on through the panel, feeder, feeder protective device, etc.

2. If accepted, heat exchangers, coils, etc., having greater pressure drops than those on which pumping heads were based, the Contractor shall be responsible for selecting proper pumps and drives and adjusting electrical service work accordingly.
- C. Structural steel members are indicated to provide supports for certain specific sizes and weights of equipment. Should a substitution request involve other equipment, the spacing of the supports shall be varied to suite the equipment. Should the weight or size of a proposed substituted item of equipment require additional supporting steel members, the Contractor shall include documentation of the additional supports in the request for substitution and install them at no change in contract price if the substitution is accepted.
- D. Various large apparatus to be installed may require that the apparatus be installed prior to the installation of portions of structural, walls, or door frames. Coordinate the installation of these items to insure that no demolition of general construction is necessary for equipment installation or that the apparatus does not have to be disassembled for installation.

1.16 STORAGE AND PROTECTION OF MATERIALS

- A. Store and protect materials and equipment as specified in Section 01 60 00, Product Requirements.
- B. Contractor shall provide storage space for protection and storage of his materials and assume complete responsibility for all losses due to any cause whatsoever. All storage shall be within the property lines of the building site, and as directed by the Architect. In no case, shall storage interfere with traffic conditions in any public or project thoroughfare.
- C. All work and material shall be protected at all times. Contractor shall make good any damage caused, either directly or indirectly, by his workmen. He shall be responsible for safe handling of all mechanical equipment and shall replace, without charge, all items damaged prior to acceptance by the Owner.
- D. On site storage shall not be inside the building during construction progress, but shall be in approved trailers or as specifically approved otherwise by the Architect. Storage inside the building shall only be allowed when so allowed by the Architect.

1.17 WIRING

- A. Unless otherwise noted, all wiring for motors, starters, and equipment is specified in Division 26.
- B. Wiring of temperature controls shall be performed in accordance with the requirements of Division 26 but shall be performed as outlined in other sections of these specifications.
- C. All power for control circuits required for the Temperature Control System shall be provided and installed where indicated on the Division 26 Drawings, but shall otherwise be provided as indicated in other sections of these specifications.
- D. Each supplier of equipment requiring control shall have wiring diagrams furnished with submittals. This shall be used to determine conduit layouts required to complete the electrical portions of the instrumentation and control systems.
- E. All motors furnished as a portion of work specified in Division 23 shall be wired as specified in Division 26.

- F. Except where combination starter-disconnects are specified elsewhere herein or in Division 16, all motors shall be provided with safety disconnect switches in accordance with the National Electrical Code as specified in Division 26.
- G. Furnish all necessary wiring diagrams for equipment specified in Division 23, as a part of equipment submittals, for installation under other sections of these specifications.

1.18 EQUIPMENT STANDARDS

- A. All basic materials and equipment shall be standard catalog products of a reputable manufacturer and shall essentially duplicate equipment which has been in satisfactory service for at least one (1) year.
- B. First of a kind new technology devices will not be considered.
- C. Accessory equipment that is required to make a complete and functioning system that is not of the same manufacturer furnishing the basic materials or equipment shall carry the guarantee of the basic material or equipment manufacturer and repair and replacement parts shall be available through normal trade channels locally.

1.19 CLEAN UP

- A. Contractor shall be responsible for cleaning up after and during all work performed under this Division of the Specifications.
- B. Contractor shall, on a daily basis, remove construction trash and debris accumulation to minimize the entrance of dust, dirt, and debris in piping, ductwork, and mechanical equipment.
- C. At the completion of construction, just prior to Substantial Completion and sustained operation of equipment, thoroughly clean the inside of piping, ductwork, and equipment.
- D. Refer to Division 1.

1.20 FINAL CONSTRUCTION REVIEW

- A. Schedule: Upon completion of the work specified in Division 23, there shall be a final construction review of the completed mechanical systems installations. Prior to this walk-thru, all work specified in this Division shall have been completed, tested, adjusted, and balanced in its final operating condition and the preliminary test report shall have been submitted to and approved by the Architect.
- B. Personnel: A qualified person representing the Contractor must be present at this final construction review to demonstrate the system and prove the performance of the equipment.
- C. Building mechanical systems shall have been in operation for a minimum of 15 days and Test and Balance work shall be substantially complete prior to this review.
- D. Exceptions to the aforementioned requirements will be considered on a case-by-case basis dependent on the size and type of project, as well as construction schedule limitations.

1.21 CERTIFICATIONS

- A. Before receiving final payment, the Contractor shall certify that all equipment furnished and all work done is in compliance with all applicable codes mentioned in these Specifications.

- B. Provide copies of all applicable approved notices and inspection certifications from the various inspections conducted by the Local Code Enforcement Authorities.

1.22 GUARANTEE

- A. The guarantee provision of this specification requires prompt replacement of all defective workmanship and materials occurring within one year of final job acceptance, Substantial Completion, or as defined by Extended Warranty Contracts. This includes all work required to remove and replace the defective item and to make all necessary adjustments to restore the entire installation to its original specified operating condition and finish at the time of acceptance.
- B. The Contractor shall also guarantee that the performance of all equipment furnished and installed under this Division of the Specifications shall be at least equal to the performance as called for in the specifications and as stated in the equipment submittals. Should there be indication that the equipment and installation is not producing the intended conditions, the Contractor shall make further tests as the Owner's Representative may direct to demonstrate that the equipment installed meets the specifications and is delivering the capacity specified or called for on the Drawings.
- C. If there is any indication that the equipment does not meet the specified quantities, the Contractor shall, at his expense, institute a program to demonstrate the adequacy of the installation. This program shall include all necessary testing and testing equipment. Should the Contractor not have the equipment or technical skill to perform the tests, it shall be his responsibility to employ recognized experts to perform the tests and shall provide certified laboratory tests, certified factory reports and work sheets, or other certified data to support results of any tests required.

END OF SECTION

SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Comply with Division 1 - General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections, as applicable. Refer to other Divisions for coordination of work with other portions of work.

1.02 SYSTEM DESCRIPTION

- A. A complete system of vibration isolation for all mechanical equipment subject to the transmission of noise and vibration to the building.

1.03 QUALITY ASSURANCE

- A. All equipment and materials shall be new and of the best quality and have been manufactured by a firm with a minimum of five (5) years of experience in this field.
- B. All equipment and materials shall be installed in a workmanlike manner by experienced mechanics and as recommended by the equipment and vibration isolation manufacturers.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and installation instructions for all vibration isolation equipment.
- B. Shop Drawings: Submit in accordance with Section 23 05 00.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during construction shall be rejected.
- B. Storage and protection of materials shall be in accordance with Section 23 05 00.
- C. Install materials and equipment at the proper time to keep pace with the general construction and the work of other trades involved so as not to delay the project completion schedule.

PART 2 PRODUCTS

2.01 GENERAL

- A. Objectionable vibration or noise created in any part of the building by the operation of any equipment furnished and/or installed under Division 23 will not be permissible.
- B. Contractor shall take all precautions against the same by isolating the various items of equipment, pipes, and ducts from the building structure and by such other means as may be necessary to eliminate the transmission of excessive vibration and objectionable noise produced by any equipment installed thereby.
- C. Design all foundations, supports, etc., for equipment, piping and ductwork with this end in view.

- D. Contractor shall supervise and instruct the construction of all foundations and supports, in order that they may be constructed in such manner as to prevent the transmission of noise and vibration.

2.02 APPLICATIONS

- A. Isolating material shall be selected in each case in accordance with the manufacturer's recommendations and the latter shall be prepared to demonstrate, upon request of the Architect, the isolation effectiveness of the material which has been installed upon his recommendation.
- B. Condensing units or other equipment to be installed on pads shall be mounted on ribbed neoprene pads equal to Amber Booth Ampad Type NR or NRC, Style B isolators.

2.03 MANUFACTURER

- A. Isolating material used shall be equivalent to Amber-Booth, Peabody, Korfund Vibration Mountings, or Mason.

PART 3 EXECUTION

3.01 PERFORMANCE OF ISOLATORS

- A. Comply with recommendations set forth by the American Society of Heating, Refrigerating and Air Conditioning Engineers for the selection and application of vibration isolation materials and units.
- B. Comply with manufacturer's recommendations for selection and application of vibration isolation materials and units.
- C. Place isolators where indicated and where specified herein. Coordinate all isolator selections with approved equipment and other pertinent shop drawings of exact equipment to be isolated. Verify to ensure accuracy of load points and take into account any accessory devices adding to equipment loads to be supported by isolators.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC EQUIPMENT AND PIPING

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Comply with Division 1 - General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections as applicable. Refer to other Divisions for coordination of work with other portions of the work.

1.02 SYSTEM DESCRIPTION

- A. Provide a complete system of Piping Identification as specified herein for each of the systems as described herein.
- B. Provide a complete system of equipment identification tags as described herein.

1.03 QUALITY ASSURANCE

- A. The installation of all mechanical system identification devices shall be performed under this Section of the Specifications using materials which are the product of reputable manufacturers. The application of the materials shall be in strict accordance with the published standards of the manufacturer of the materials, using any special materials as required by these specifications and by those published standards.
- B. Manufactured Piping Identification markers, equipment name plates and valve tags shall be a product of Seton Name Plate Corporation, EMED Company, Inc., or Craftmark Identification to meet all ANSI Standards pertaining thereto.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and installation instructions in accordance with Section 23 05 00.
- B. Shop Drawings:
 - 1. Submit a list of all piping systems to be identified, color of background to be used, legend or wording to be displayed for each system, and the intended location of all markers to be displayed.
 - 2. Submit a list of equipment to receive identification tags, cut sheets and proof copies of tags which indicate location of tag and wording to be engraved thereon.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during construction shall and will be rejected.
- B. Storage and protection of materials shall be in accordance with Section 23 05 00.

PART 2 PRODUCTS

2.01 PIPING IDENTIFICATION SYSTEM

- A. Furnish piping identification markers for all insulated and uninsulated piping systems in sizes and colors in accordance with ANSI Standard A13.1. Markers shall be as

manufactured by Seton Name Plate Corporation similar to their vinyl plastic "Setmark" pipe markers with flow arrows. For systems with overall outside diameters under 6" use the snap-around markers. For systems with overall diameters 6" and over use strap-around markers attached with nylon ties.

- B. Markers shall be provided as a minimum for the following systems:
- C. Drains (Green background), for all insulated drains not contained in one space or roof; i.e., an A/C condensate drain in a fan room shall not require identification, whereas, a drain extending to another space would.
- D. Refrigerant suction (Green background).
- E. Refrigerant Liquid (Green background).
- F. Refer to Section 09900 for color code paint requirements for all exposed mechanical equipment and piping.

2.02 EQUIPMENT IDENTIFICATION

- A. This Contractor shall provide identification plates similar and equal to Seton Name Plates, Style 15671(M4564).
- B. Name plates shall be a minimum of 1/16" thick flexible multi-layered acrylic and be 1" X 3" in size with beveled edges. The surface shall be a black satin with a white core for lettering. Other color combinations may be used for specific systems where warranted. Each plate shall be drilled with two mounting holes sized for 3/8" No. 3 round head nickel plated steel screws. Lettering shall be a minimum of 3/16" high and lettering shall be cut through the black surface to the white core and be "Gothic Normal". Only name plates equal to those specified will be considered. No punched plastic tape or engraved aluminum plates are acceptable. Stick-on only plates are not acceptable.
- C. Provide and install identification plates on the cover of all starters or disconnects or combination starter-disconnects, where not mounted directly on the equipment, delivered by the mechanical system installer to the electrical systems installer and on each piece of Mechanical Equipment to include but not necessarily limited to:
 - 1. Split Direct Expansion Indoor (Fan Coil) A/C Units.
 - 2. Remote Air Cooled Condensing Units.
- D. Name plates shall have complete words describing equipment type, use and service. As an example, air handlers shall be designated "AHU-S-X MEP Shop" to designate the equipment as an air handler, number of air handler and area served. Use multiple or larger name plates as required to fulfill this requirement.

PART 3 EXECUTION

3.01 PIPE MARKER INSTALLATION

- A. Provide flow arrows at each marker location.
- B. Markers shall be spaced not more than 30 feet on center and at each change of direction but not more than 4 feet in each direction from each elbow and tee. Markers not required on piping runouts less than four feet (4') in length and 1-1/4" or smaller in size.
- C. Identification markers shall be installed on all new piping; indoors, outdoors and in the crawl space except for drain and waste lines 3/4" and smaller.
- D. Install markers on exposed piping systems only after jacketing systems and finish paint coats are complete. Refer to Sections 09 90 00 and 23 07 00.

3.02 IDENTIFICATION TAG INSTALLATION

- A. Secure tags level and in a conspicuous location with adhesive on equipment starters or combination starter disconnects and on the equipment where starters are not immediately adjacent to the equipment served.
- B. Additionally, secure all tags with screw fasteners after secured with adhesive.

END OF SECTION

SECTION 23 07 00

INSULATION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Comply with Division 1 - General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections as applicable. Refer to other Divisions for coordination of work with other portions of work.

1.02 SYSTEM DESCRIPTION

- A. Provide the systems of insulation which are specified for the control of heat transfer, sound control, and prevention of condensation.
- B. Provide protective devices to prevent compression abrasion or puncture of the piping insulation systems installed to include inserts, pipe shields, PVC jacketing and aluminum jacketing as specified herein.
- C. Provide piping identification systems as specified in Section 23 05 53, Mechanical Systems Identification for HVAC ductwork, equipment and piping.

1.03 QUALITY ASSURANCE

- A. The installation of all thermal insulation shall be performed by a single firm regularly engaged in the insulation business, using skilled insulation mechanics and using insulation materials which are the product of reputable manufacturers. The application of the materials by the insulator shall be in accordance with the published standards of the manufacturer of the materials, using any special materials as required by these specifications and by those published standards.
- B. Materials shall be manufactured by Schuller, Pittsburg Plate Glass, Owens-Corning, Foster, Childers, Certainteed, Johns Manville, or Knauf.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and installation instructions to allow review of Materials and Methods to ensure complete compliance with specifications.
- B. Shop Drawings: Submit materials to be used and method of application for each system in tabular form. General statements not specifically identifying means or methods to be used shall be cause for rejection. Include descriptive data and cut sheets on each type of insulation material, sealing method, adhesives used, insert types, shield sizes, and PVC or aluminum jacketing as specified.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during construction shall and will be rejected.
- B. Promptly replace all damaged, deteriorated or wet insulation materials.
- C. Storage and protection of materials shall be in accordance with Section 23 05 00.

PART 2 PRODUCTS

2.01 PIPING AND EQUIPMENT INSULATION MATERIALS

A. Waste, Drain and Miscellaneous Lines:

1. The drain from each piece of Air Handling Equipment condensate drain pan and all refrigerant suction piping shall be insulated with foamed plastic, Armstrong Armaflex, Fiberglas O-C flexible, Certainteed-St.Gobain Ultra Foam or Schuller Aerotube slipped on while the piping is being fabricated, and with all joints, butt type, sealed using an adhesive recommended by the manufacturer of the plastic. The insulation shall be continuous from the drain opening in the Air Handling equipment condensate pan to the point of discharge with an open sight air gap over a drain. All formed plastic insulation shall meet ASTM E-84 requirements. Provide 1/2" thick insulation on condensate drains and 1-1/2" thick insulation on refrigerant suction piping. For all "Armaflex" type insulation installed outdoors apply two (2) coats of NOMACO K-Flex R-374, or Foster 30-64, or approved equal, protective coating (ultra-violet rays), white in color.

B. Plenum Safe Jacketing:

1. Where non-plenum rated piping (such as PVC, CPVC, FRP, PE, PP, ABS, PVDF, etc.) is installed in return air plenums cover all exposed portions of this piping with a plenum safe jacketing, or wrap, system that is a factory manufactured and tested non-combustible barrier, to flame and smoke spread, designed to encapsulate non-rated or combustible items located in return air plenums, in accordance with the most recent additions of the International Building and Mechanical Codes.
2. Plenum safe jacketing shall be covered with a light weight fiberglass reinforced foil scrim finished high temperature rated insulation with an approximate density of 6 pounds per cubic foot. Jacketing shall have a Flame Spread and Smoke Developed rating of 0 for the unfaced blanket and be under 25 and 50 respectively for these items as tested in accordance with U.L. 723 and ASTM E-84. Maximum Flame Spread in accordance with U.L.1887 shall be 0 feet. Maximum smoke/optical density and Average Smoke per U.L.1887 testing shall not exceed 01 and 0 respectively. U.L. 1887 test procedure is a modified tunnel test which provides test data for flame spread and smoke density using a single plastic pipe and a bundle of plastic pipes of various sizes subjected to a fire test.
3. Thermal resistance of the barrier system shall be 4.2 as tested in accordance with ASTM C518. The Barrier System shall be able to withstand an operating temperature up to 2,300 Deg.F. and have a melting point of no lower than 3,100 Deg.F.
4. Plenum safe jacketing shall be a minimum 1/2 inch thick and have at least one side covered with a foil skin which must face the outer, or exposed, side. All joints in each direction shall be overlapped a minimum of one inch (1"). Jacket shall be secured tightly around the piping with either stainless steel banding or stainless steel tie wire. Use stainless steel crimp clamps on banding fasteners. Tie wires shall be secured using twist tensioning. Seal all cut edges with aluminum foil tape to ensure there is no exposed fiber.
5. Plenum safe jacketing shall be as manufactured by:
 - a. Great Lakes Textiles, Inc. or approved equals by;
 - b. 3M Corporation.
 - c. Thermal Ceramics.
 - d. FryeWrap by Unifrax.

2.02 DUCTWORK INSULATION MATERIALS**A. Duct Insulation - External:**

1. Concealed (above ceilings) external duct insulation shall be glass fiber blanket-type insulation of not less than 1 lb. per cu.ft. density with a factory applied flame-retardant vapor barrier facing. Facing shall consist of a layer of aluminum foil, reinforced layer of glass fibers, and a layer of kraft paper all bonded together with fire-retardant and adhesive. Insulation, adhesives, and tapes shall be rated in accordance with U.L. 181A or 181B. Minimum ductwrap insulation thickness shall be two inches (2") thick and be equal to Certainteed Type IV duct wrap.
2. All insulation systems shall meet the requirements of the most recent version of the International Energy Conservation Code, which requires a minimum installed R-value of 5.0 for conditioned, cooled or heated, and outside air system ductwork and plenums when located inside buildings or spaces. Increase insulation thicknesses as required to comply.
3. Water Vapor Permeance shall be no greater than 0.05 Perms per ASTM-E-96.
4. Fire Hazard Classification of installed duct insulation systems shall meet the requirements of ASTM-E-84; Flame Spread of 25, or less; Smoke Developed and Fuel Contributed of 50, or less. All insulation systems, adhesives, mastics, sealants, and tapes shall be U.L. rated for the application. All tapes used shall be acrylic based.
5. All external duct insulation shall be a regularly manufactured product of one of the following:
 - a. Knauf.
 - b. Owens Corning.
 - c. Johns Manville.
 - d. Certainteed.

B. Duct Insulation - Internal:

1. Internal duct insulation, liner, shall be in thicknesses as indicated herein, and be as specified in Specification Section 23 30 00. Duct liner shall be one inch (1") thick on all return, transfer, and relief air ducts, and on portions of general exhaust air ductwork systems as specified elsewhere herein. Internal duct insulation on all conditioned, cooled or heated, supply, all outside air ductwork systems and all mixed air plenums shall be 1-1/2" thick duct liner.
2. All duct liner shall be made of glass fiber coated with a bonded mat on the air stream side of the insulation. Coating shall be neoprene based meeting the requirements of NFPA-90A and U.L. Standard 723. Insulation shall not be less than 1.5 lbs. per cu.ft. density, and have a K-value of 0.28 per ASTM-C-177 at a mean temperature of 75 Deg.F.
3. All insulation systems shall meet the requirements of the most recent version of the International Energy Conservation Code, which requires a minimum installed R-value of 5.0 for conditioned, cooled or heated, supply and all outside air system ductwork and mixed air plenums when located inside buildings or spaces. Increase insulation thickness as required to comply.
4. Fire Hazard Classification of installed duct insulation systems shall meet the requirements of ASTM-E-84; Flame Spread of 25, or less; Smoke Developed and Fuel Contributed of 50, or less.
5. All insulation systems, adhesives, mastics, sealants, and tapes shall be U.L. rated for the application.
6. All duct liner shall be suitable for the air velocities to be encountered in each system, and shall generally be suitable for velocities of up to 6000 FPM.

7. Acceptable duct lining manufacturers shall be:
 - a. Certainteed.
 - b. Knauf.
 - c. Owens Corning.
 - d. Johns Manville.

PART 3 EXECUTION

3.01 GENERAL

- A. Apply insulation and pipe covering after all of the piping system to be insulated has been pressure tested, found to be completely tight (without leaks), and accepted as such. All insulated T-handles, blow-down valves, extended handles and caps should be installed prior to commencing with insulation. Verify that control, isolation, and balancing valves and any other piping specialty where a valve stem or test port extends beyond the normal pipe insulation thickness to be installed is installed pointed upward vertically. Thoroughly clean and dry all surfaces prior to being covered.
- B. On glass fiber pipe covering with factory applied vapor barrier jacket, lap the jacket on the longitudinal seams and seal with vapor barrier lap adhesive equivalent to Foster 85-20 or Childers CP-82. Tightly butt the ends and cover butt joints with a 4" wide band of vapor barrier jacket secured with the same adhesive. On piping systems with contents below ambient temperature, coat all taped ASJ butt and longitudinal seams with vapor barrier coating to prevent moisture ingress.
- C. Where jacketing systems are specified, use standard weight, PVC sheet rolls. Exercise care to locate seams in an inconspicuous place and apply all jacketing neatly, including that on valves and fittings. Unsightly work will be considered a justifiable basis for rejection. Adhere the jacketing in all cases with a lagging adhesive, Foster 30-36 AF (Anti-Fungal) or Childers CP-137 AF, or by other approved methods. Adhesives shall have mold and mildew inhibitors. Lagging adhesives shall meet ASTM D 5590 with a "0" growth rating.
- D. All insulation shall be continuous through wall and ceiling openings and sleeves. Use exterior duct wrap insulation on the outside of smoke and fire damper sleeves. Create a secondary sleeve around the primary sleeve to allow a complete insulation system as allowed by the local authority having jurisdiction.
- E. All insulation and accessories shall have composite (insulation, jacket and adhesive used to adhere the jacket to the insulation) fire and smoke hazard ratings as tested under procedure ASTM E-84, NFPA 255, and UL 723 not exceeding:

Flame Spread	25
Smoke Developed	50
Fuel Contributed	50

- F. Unsightly work shall be cause for rejection, including poor application of adhesives and coatings beyond the insulation which coats valves or other piping specialties.
- G. Damage or Modification to Insulation: Where new insulation is disturbed or damaged during the process of installing other new materials, making new connections, etc., it shall be repaired or replaced to return it to its original condition and appearance. Where lines are removed and connections to insulated lines are capped, insulate those caps as well as repairing damaged insulation. Materials shall match those presently installed in thickness, density, insulating value, jacketing, etc.

- H. Hanger and Support Locations: At the location of hangers or supports for pipes run above ground and finished with a vapor seal insulation, provide rigid sections of cork, Foamglas, calcium silicate or high density polyurethane, at least the same thickness as the adjacent insulating material to adequately support the pipe without compression of the insulating material and cover with a vapor seal that is bonded to the adjacent insulation as described for fittings in the lines. Where the insert has an insulating value less than the adjacent pipe insulation the thickness of the insert shall be increased to equal the insulating value of the adjacent pipe insulation. Wood inserts shall not be allowed. Hangers and supports for piping insulation to receive a vapor barrier shall be installed exterior to the insulation.
- I. Material Changes: Wherever there is a change in materials on lines that are vapor sealed, apply a suitable vapor barrier that is compatible with both materials, tapes, etc., as required to maintain the vapor barrier.
- J. The following describes materials, thickness and finishes for insulation on piping. In the following "exposed" shall mean any line or duct exposed below the finished ceiling and structure where no ceiling is installed, in any room space, area, mechanical rooms, closets, and any line or duct run exterior to the building, including above the roof. "Concealed" shall mean any line or duct located above ceilings, in furrings, in chases, in crawl spaces, and buried in direct contact with the soil.
- K. In all "exposed" areas, up to 12'-0" above the finished floor, insulation shall receive a PVC jacketing system. Neatly install all insulation systems not receiving jacketing such that they are suitable for finish painting.
- L. All insulation materials and jacketing shall exhibit the following characteristics:
 - 1. Water sorption, per ASTM C 1104, shall be less than 0.02%.
 - 2. Linear shrinkage, per ASTM C 356, shall be negligible.
 - 3. Stress corrosion, per ASTM C 795, shall not cause corrosion.
 - 4. Corrosiveness, per ASTM C 665, shall not be any greater than sterile cotton.
 - 5. Resistance to fungi, mold and mildew and bacteria, per ASTM C 665, shall be rated as not promoting growth of fungi and bacteria. Inhibitors shall be added to specified products to meet these requirements.

3.02 DUCTWORK

- A. Duct Insulation - Internal: Provide sound absorbing and thermal insulation to the interior surface of the following duct systems: All rectangular low pressure supply, return, relief, transfer, and outside air ducts and supply, mixed, and return air plenums. All lined ductwork shall be increased in size to maintain the clear inside (air stream) dimensions designated on the Drawings.
 - 1. Duct liner shall be applied in accordance with the manufacturer's recommendations, with the coated, or mat-faced, surface located away from the metal (exposed to air stream). It shall be adhered to the metal with Foster 85-60 or Childers CP-127 adhesive applied to the entire inner surface of the duct. The liner shall be further secured to the duct with Graham Insulating Pins and Clips or other metal clips of the type which do not protrude through the duct. Those clips shall be installed on not greater than 12" centers both ways. All seams and openings in the liner shall be carefully sealed with adhesive.
 - 2. Paint all joints in liner and butter the edges of sections where sections of ductwork will be joined using Foster No. 30-36 or Childers CP-137, or equivalent approved adhesive. Alternately, use a black "duct butter" which shall be Childers CP-135-2.
 - 3. Where damper rods occur, suitable metal bushings shall be provided on each end of the damper rod inside the duct, to provide clearance between the damper blade and the lining.

4. Refer to Section 23 09 00 as applicable, Air Distribution Duct Systems.
5. Due to the most recent version of the International Energy Conservation Code, conditioned air, heated or cooled air (includes outside air intake ductwork), ductwork insulation located inside the building envelope shall have a minimum installed R-value of 5.0. For lined ductwork, this shall be accomplished by using 1-1/2" thick duct liner. Coordinate insulation requirements with other Sections of these Specifications.

B. Duct Insulation - External:

1. Externally insulate all rectangular and round supply and return air ducts not containing internal lining.
2. Additionally insulate the outside of all fire, fire-smoke, and smoke damper sleeves penetrating walls and floors to insure a continuous insulation system.
3. External insulation shall be applied in accordance with the manufacturer's recommendations by impaling over pins using speed clips or be secured with adhesive.
4. Seal all joints, breaks, fastener penetrations and punctures with a 3" wide vapor barrier strip similar to that of facing materials secured with adhesive. Pins shall be spaced 12" on center both ways. Adhesive shall cover the entire duct surface.
5. Blanket type insulation shall generally be used on concealed ductwork only with rigid insulation board being used exclusively on exposed ductwork, which shall also receive a PVC jacket when located 12'-0", or less, above the finished floor.
6. Vapor Seal all jacketing penetrations, cut openings, and cut edges and taped seams with an approved vapor barrier coating, Foster 30/80 or Childers CP-38 vapor barrier coating. Coatings shall adhere to MIL-PRF-19565 and have a maximum permeance rating of 0.03 or less at 45 mils dry per ASTM-E-96, procedure B.

3.03 SHIELDS AND INSERTS

- A. Metal saddles, shields, shall be applied between hangers or supports and the pipe insulation. Saddles shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts. Shields shall be made of galvanized sheet metal and shall be of sufficient size and length to prohibit the crushing of the insulation materials. Saddle shields shall be as follows:

Pipe Size	Metal Saddles	
	Metal Gauge	Length
3/4" to 3"	18	12"
4" to 6"	16	12" - 18"
8" to 10"	14	24"
12" & Larger	12	24"

END OF SECTION

SECTION 23 21 13

CONDENSATE PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Comply with Owner furnished General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections, as applicable. Refer to other divisions for coordination of work with other portions of Work.

1.02 SYSTEM DESCRIPTION

- A. Furnish and install condensate piping as specified, or shown on the Drawings for the installation of the work specified in Division 23. The location, direction, and size of the various lines are indicated on the Drawings.
- B. Piping systems shall include all appurtenances shown on the drawings and specified herein.
- C. The work shall include the furnishing and installing of hangers and supports for pipes.
- D. Penetrations of walls to structure shall be sealed off to limit noise transmission through sleeves. Provide fire sealant at floor and wall penetrations, as applicable.

1.03 QUALITY ASSURANCE

- A. All equipment and materials shall be new and of the best quality.
- B. All equipment and materials shall be installed by experienced mechanics certified and trained for the work performed.

1.04 SUBMITTALS

- A. Product Data: Submit complete manufacturer's descriptive literature and installation instructions in accordance with Section 23 05 00 for all piping materials to be used for each system, valves and hydronic specialties as specified herein.
- B. Shop Drawings:
 - 1. Submit in accordance with Section 23 05 00.
- C. Fully coordinate all piping shop drawings with sheet metal shop drawings and other trades. Failure to submit shop drawings in a timely manner, as required to keep pace with the construction and work of all other trades, will result in delays, and possible stoppage, of payment to the Contractor. Additionally, no work may proceed until such shop drawings are submitted, reviewed, and found to be acceptable by the Engineer.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during construction shall and will be rejected.
- B. Storage and protection of materials shall be in accordance with Section 23 05 00.
- C. Take special precautions to protect the inside of all pipes and valves from construction dirt and debris. If valves are stored on site cover valve openings until just prior to installation but in no case shall valves be unprotected for more than 48 hours.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. In general, the following listed materials shall be used in fabricating the piping systems. Where special classes of piping are involved and are not listed, the Contractor shall request instructions as to the class of material involved and the method of fabricating it before ordering the materials.
 - 1. Miscellaneous primary drains from D/X Units: Type "M" or DWV (1-1/4" and larger) hard drawn copper.
- B. In general, fittings used for the various piping systems shall be as listed below. Special fittings shall be used where required by job conditions and when approved for particular use.
- C. Fittings for copper tubing shall be Chase Sweat Fittings, Nibco, Elkhart, or Mueller Brass Company's "Streamline" type solder fittings. Drainage type fittings shall be used wherever possible in drainage systems only. All solder for copper tubing shall be 50-50 or better. All piping shall be installed according to the manufacturer's instructions. All joints shall be thoroughly cleaned before connecting. All elbows shall be the long radius type unless noted otherwise.
- D. Miscellaneous Fittings: Provide all reducers, increasers, adapters, bushings, etc., as required to properly inter-connect the various items, to change sizes, etc. Copper and red brass fittings shall be used in copper lines.
- E. All piping materials and fittings shall be manufactured in the United States.

2.02 PIPE HANGERS

- A. Pipe hangers shall be as manufactured by Anvil International, Inc. and be of a type suitable for each use. Approved equals by Mason Industries, Inc., B-Line, Erico Caddy, and PHD Manufacturing, Inc. will be considered.
- B. Heating and air conditioning pipe 3/4" in size up to and including twelve inches (12"), shall be Anvil Fig. 260, adjustable clevis hangers. Hangers shall be sized to be on the outside of the insulation.
- C. Where several pipes are routed parallel to each other and at the same elevation, trapeze hangers may be used. Where trapeze hangers are used, the pipes shall be supported on rollers where rollers are called for elsewhere by these specifications.
- D. For bare copper pipes (uninsulated only) up to and including three inches (3") in size, use Anvil Fig. CT-109 malleable iron, copper plated, split ring, hangers or Anvil Fig. CT-65 copper plated clevis hangers. For uninsulated copper pipes larger than three inches (3"), use Anvil Fig. CT-65 copper-plated clevis hanger.
- E. Hanger rod sizes shall conform to the following schedule:

Pipe up to, and including 2"	3/8" rods
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- F. Unless shown otherwise on the Drawings, all horizontal runs of copper piping shall be suspended from the floor or roof construction, as the case may be, by means of hangers with the following maximum spacing:

Pipe up to 3/4" in size	6 feet
Pipe 1" and 1-1/4"	8 feet
Pipe 1-1/2" and 2"	10 feet
Pipe 2-1/2" and larger	12 feet

- G. There shall be a hanger within two feet (2') of each elbow or tee. Additional supports shall be provided for valves, strainers, etc. Cast iron pipe shall have not less than one hanger per length of pipe. Vertical risers shall be supported by approved riser clamps. Vertical pipes within a space shall have not less than two (2) supports. Where the vertical run of pipe in a space exceeds 14 feet then three (3) supports shall be required.
- H. Supports and hangers shall be installed to permit free expansion and contraction in the piping systems. Hangers shall permit vertical adjustment to maintain proper pitch. Where necessary to control expansion and contraction, the piping shall be guided and firmly anchored. No piping shall be self-supporting; nor shall it be supported from equipment connections.
- I. Inserts shall be used where piping or equipment is to be hung from concrete construction. Inserts shall be Anvil Fig. 281, wedge type, concrete inserts. All inserts shall be pre-treated to prevent rusting. After the forms are removed, clip off all nails flush with the exposed surface of the inserts.
- J. Expansion bolts shall be Ackerman-Johnson.
- K. Beam clamps suitable for the use with the type of steel construction involved shall be an Anvil product or an approved equal as indicated elsewhere herein.
- L. No perforated straps shall be used to support any mechanical equipment item or piping of any kind.
- M. Condensate drains, piping hangers shall be sized to go around the insulation with shields being provided to protect the insulation. Shields shall be Anvil Fig. 167.
- N. For pipe sizes 8" and under use Anvil Fig. #93 and 94 beam clamps. For pipe sizes 10" through 18" use Anvil Fig. #66 in the "U" position.

2.03 SLEEVES AND ESCUTCHEONS

- A. Generally where pipes pass through interior building walls or floors above the first floor (out of the ground), 22 gauge galvanized sheet metal sleeves shall be used. Sleeves shall extend a minimum one inch (1") above a floor or beyond the wall, as applicable.
- B. For concrete or masonry walls, sleeves shall be inserted into the masonry, decking or form work prior to the pouring or placement of concrete or masonry units to create a leave out.
- C. The sizes of all sleeves shall be such as to permit the subsequent insertion of the intended pipe of the proper size with adequate clearance for movement due to expansion and contraction. In the case of insulated lines, the diameter of the sleeves shall be at least 1/2" greater than the outside walls of the pipe with specified thickness of insulation. This will require that the inside diameter of galvanized steel pipe sleeves be at least 1/2" greater than the outside diameter of the service pipe with insulation. Galvanized steel pipe sleeves set in floors shall project two inches (2") above the floor.
- D. After the pipes are installed, fill the annular space between the pipe, and insulation as required, and its sleeve with an approved mastic or caulk. Use loose fibrous insulation packing as required to accomplish this. In all cases the annular spaces around the pipes

within the sleeved openings shall be filled with loose fibrous insulation and then sealed with an approved caulking or expanded foam insulation.

- E. Escutcheons, except as specifically noted or specified, shall be installed on all pipes passing exposed through floors, walls, or ceilings. Escutcheons shall be equal to the Crane No. 10, chrome plated sectional floor and ceiling plates, and shall fit snugly and neatly around pipe or pipe insulation or insulated lines. Solid chrome plates with set screws shall be used if sectional plates do not fit properly or stay in place. Where multiple pipes penetrate floors or walls in close proximity in concealed areas, shop made sheet metal escutcheons may be used.

PART 3 EXECUTION

3.01 PIPING - GENERAL

- A. Where special classes of piping are involved and are not listed, the Contractor shall request instructions from the Owner's Representative as to the class of material involved and the method of fabricating it before ordering any material.
- B. The location, direction, and size of all lines are generally indicated on the drawings. Branch connections in general are indicated and shall be so installed as to provide proper grades.
- C. All lines shall be made up straight and true at proper grades. All condensate drain lines shall grade down to drains.
- D. Piping shall follow as closely as possible the routes shown on the plans and take into consideration conditions to be met at the site. Should any unforeseen conditions arise, lines shall be changed or rerouted as required after proper approval has been obtained.
- E. All piping shall be installed with due regard to expansion and contraction and so as to prevent excessive strain and stress in the piping, in connections, and in equipment to which the lines are connected.
- F. All screw joints shall be made with taper threads, properly cut. Joints shall be made tight with graphite and oil applied to the pipe threads only and not to the fittings.
- G. Dielectric couplings shall be installed where ferrous materials join copper lines and shall be rated for the intended medium pressure and temperature or service.
- H. Provide and install unions at proper points to permit removal of pipe and various equipment and machinery items without injury to other parts of systems. No unions will be required in lines assembled with solder joint fittings except at equipment items or coils, machinery items and other special pieces of apparatus. Unions in 2" and smaller lines shall be ground joint and unions 2-1/2" and larger shall be flanged unions. Unions shall be the same material and strength as other fittings in the lines. Companion flanges on lines at various items of equipment, machines, and pieces of apparatus shall serve as unions to permit removal of the particular item.
- I. All piping shall be supported by hangers independently of equipment connections. The weight of the piping and it's contents shall not be imposed on the equipment in any way.
- J. Mitering of pipe to form elbows, notching of straight runs to form tees, or any similar construction will not be permitted.
- K. Expansion loops shall be provided wherever shown on the Drawings or wherever else necessary to allow for the expansion and contraction of piping. This shall be accomplished in an approved manner and this Contractor shall be responsible for any damage which may occur as a result of expansion and contraction of his piping.

- L. Nipples shall be of the same size and material as the piping in the system in which the nipples are installed, except that "close", or "all thread" nipples shall not be used.
- M. Keep all open ends of piping in each system plugged or capped to prevent dirt or other debris from entering the pipe at any and all times during construction and before fixtures or equipment is connected. All piping shall be flushed clear prior to connection to the central building systems.
- N. The ends of all piping furnished and installed in all systems shall be thoroughly reamed to the full inside diameter of the respective pipe.
- O. Exposed and concealed lines shall be run parallel with, and perpendicular to building lines and wherever possible shall be grouped together for easy service and identification. Whenever possible, horizontal and vertical runs shall be held as close as possible to the walls, ceilings, struts, members, etc., so as to occupy the minimum space consistent with the proper installation requirements for insulation, conduit, ductwork, lighting fixtures, etc., and the expansion requirements of each of these items and the building proper or the removal of the respective or adjacent pipes, conduits, and ductwork, and to allow for necessary access to valves, other pipes, conduits, dampers, etc.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Comply with Division 1 - General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections, as applicable. Refer to other divisions for coordination of work with other portions of Work.

1.02 SYSTEM DESCRIPTION

- A. Furnish and install all refrigerant piping of every kind required, specified, or shown on the Drawings for the installation of the work specified in Division 23. The location, direction, and size of the various lines are indicated on the Drawings. Lines for pilot and controls and instrumentation are not shown but shall be installed as required and as specified.
- B. Piping systems shall include all appurtenances shown on the drawings and specified herein.
- C. Valves or cocks shall be installed to control the flow of refrigerant to each of the various systems, to segregate individual items of equipment, and to permit ease of installation and servicing as directed on the Drawings and specified.
- D. The work shall include the furnishing and installing of all supporting structures and members for pipes and equipment.
- E. Support devices and members shall include vibration and noise isolating devices and assemblies. Penetrations of walls to structure shall be sealed off to limit noise transmission through sleeves.

1.03 QUALITY ASSURANCE

- A. All equipment and materials shall be new and of the best quality.
- B. All equipment and materials shall be installed by experienced mechanics certified and trained for the work performed.

1.04 SUBMITTALS

- A. Product Data: Submit complete manufacturer's descriptive literature and installation instructions in accordance with Section 01 30 00 for all piping materials to be used for each system, valves and refrigerant specialties as specified herein.
- B. Shop Drawings: Submit in accordance with Sections 01 30 00 and 23 05 00. Submit 1/4" = 1'-0" Scale Refrigerant Piping Shop Drawings. These shop drawings may be inclusive with other piping or ductwork shop drawings.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during construction shall and will be rejected.
- B. Storage and protection of materials shall be in accordance with Section 23 05 00.

- C. Take special precautions to piping and special internals from construction dirt and debris. If valves are stored on site cover valve openings until just prior to installation but in no case shall valves be unprotected for more than 48 hours.
- D. Openings in piping system, coil headers, valves and other heat exchangers shall be covered during the construction period to protect the interior accumulation of dirt and debris in these systems until immediately prior to connection to these components to similarly protected systems.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. In general, the materials indicated herein shall be used in fabricating the refrigerant piping systems. Where special classes of piping are involved and are not indicated, the Contractor shall request instructions as to the class of material involved and the method of fabricating it before ordering the materials.
- B. Piping shall be Type L, ACR cleaned and capped, copper. All fittings shall be long radius elbows and standard tees.
- C. Only "Silfos" solder joints shall be used for fitting fabrication.
- D. Miscellaneous Lines: Pilot, bleed, control, sampling, and equalizing lines, and similar auxiliary lines shall be fabricated of the material used in the system to which they are connected in each case.
- E. Miscellaneous Fittings: Provide all reducers, increasers, adapters, bushings, etc., as required to properly inter-connect the various items, to change sizes, etc. Copper and red brass fittings shall be used in copper lines.
- F. Fittings for copper tubing shall be Chase Sweat Fittings or Mueller Brass Company's "Streamline" solder fittings. All piping shall be installed according to the manufacturer's instructions. All joints shall be thoroughly cleaned before connecting. Silfos solder shall be used on all refrigerant piping.

PART 3 EXECUTION

3.01 DELIVERY AND PROTECTION

- A. Deliver all piping and appurtenances to each site. All components shall be handled carefully to avoid damage and be protected from exposure to the weather and dirt. All items shall be examined upon delivery to the site and evidence of abuse, damage, or exposure to weather and dirt shall be grounds for refusal to accept individual pieces. Rejected items shall be replaced promptly at no cost.
- B. During construction, take all steps necessary to protect piping and accessories from damage or vandalism. All damage or vandalism shall be repaired at no cost to the Owner.

3.02 CONDENSING UNIT INSTALLATION

- A. Install condensing units level on the roof where shown with vibration isolation as specified in Section 23 05 48.
- B. Route refrigerant piping and make connections to DX coils as recommended by the unit manufacturer and as required to meet the capacity control requirements specified.
- C. Furnish and install, if not specified to be factory assembled, all refrigerant piping specialties including, but not limited to, thermal expansion valves, sight glasses, solenoid valves, accumulators, hot gas bypass components, hot gas mufflers, and filter dryers.

- D. Charge all refrigerant piping systems and equipment to maintain a fully operating refrigerant charge.
- E. Pipe refrigerant relief piping to the outdoors or as otherwise required by the local authorities having jurisdiction and the manufacturer.

3.03 REFRIGERATION PIPING

- A. Piping shall be Type "L" copper. ACR cleaned and capped. All fittings shall be cleaned and degreased before use.
- B. Flow inert gases such as dry nitrogen through the piping while heating pipe or fittings for joining. Install liquid line drier and sight glass near condensing unit.
- C. Leak testings: After the system is installed and before any piping is insulated. The entire refrigeration circuits must be thoroughly leak tested. The following test procedure is recommended:
 - 1. Remove and plug the connection points of any controls or relief valves that could be damaged by test pressure.
 - 2. Connect a cylinder of oil-pumped, dry nitrogen to the front seat port of the compressor discharge valve or at the liquid line charging valve.
 - 3. Test at 150 psig or the leak test pressure specified by local code.
 - 4. Tap each solder connection sufficiently hard to start any leak that might subsequently open from thermal expansion and contraction or vibration.
 - 5. Test all pipe joints for leaks. Brush each connection with a soap solution and watch for bubbles.
 - 6. After leak test, charge enough refrigerant through the liquid line charging valve to raise the system pressure to approximately 10 psig. Remove the refrigerant connection and charge enough nitrogen into the system to raise the test pressure to 150 psig or the local code requirement.
 - 7. Check all parts of the system with a halide torch, or electronic leak detector.
- D. Evacuation:
 - 1. Connect the vacuum pump to as many points of the system as possible. Vacuum gauge, a Zimmerli Gauge, or an electronic vacuum gauge, shall be connected to the liquid line charging valve. Open compressor valves. Open the liquid line charging valve.
 - 2. Operate vacuum pump until a vacuum equivalent to 500 microns is registered by the vacuum gauge.
 - 3. When the system has been evacuated, charge enough oil-pumped dry nitrogen into the system to raise the pressure to atmospheric. Re-evacuate the system.
 - 4. After the 500 micron vacuum reading has been re-established, stop the system and allow it to stand under vacuum for a minimum of 12 hours. If the vacuum reading remains unchanged, the system is ready to receive it's charge of refrigerant.
- E. Charging:
 - 1. Charge the system with new, clean oil and refrigerant of the proper type.
 - 2. Charge until the sight glass is bubble free.
 - 3. Check charge level after system has operated for 24 hours in warm weather. Add oil and refrigerant as needed under these conditions.

END OF SECTION

SECTION 23 30 00

HVAC AIR DISTRIBUTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Comply with Division 1 - General Requirements and referenced documents.
- B. Comply with all other Division 23 Sections as applicable. Refer to other Divisions for coordination of work with other portions of work.

1.02 SYSTEM DESCRIPTION

- A. The scope shall include the furnishing and installation of all ductwork as shown on the Drawings; acoustical and thermal linings; flexible ducts and connections; combination smoke and fire dampers, smoke dampers, and fire dampers; duct access doors; air diffusers, grilles and registers; air volume control devices; hangers and supports; plenums and casings; turning vanes; air filters; installation of temperature control dampers, and other appurtenances necessary for a complete and operational system.
- B. All work shall be preceded by taking measurements at the job site, fully coordinating all work with other trades, verifying available spaces for ductwork, and developing Shop Drawings illustrating such.

1.03 QUALITY ASSURANCE

- A. All equipment and materials shall be new and of the quality as specified herein. All work shall comply with the most recent Local Building Code, Mechanical Code, Fire Code, and all other applicable National, State and Local Codes or ordinances.
- B. All equipment and materials shall be installed in a workmanlike manner by trained and experienced sheet metal technicians and mechanics as recommended by the manufacturers of the products installed.
- C. Where the standards and requirements of this specification exceed those of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) the requirements herein shall govern. As a minimum all ductwork shall be constructed to meet all functional criteria defined in Section 11 of the 2005 SMACNA "HVAC Duct Construction Standards, Metal and Flexible," Third Edition. However, all ductwork shall comply with all code requirements noted above to include meeting deflection limits established in the local Mechanical code.
- D. The work shall be guaranteed for a period of one (1) year from and after the date of acceptance of the job, "Substantial Completion", against noise, chatter, whistling, or vibration, and free from pulsation under all conditions of operation. After the system is in operation, should these defects occur, they shall either be removed and replaced or reinforced as directed by the Owner's Representative.
- E. Air quantities shown on the Drawings, or specified, are based on air at 75 Deg.F. dry bulb, 50 percent relative humidity, and 29.92 inches H.G. barometric pressure.
- F. Except where specified otherwise, all sheet metal used shall be constructed from prime galvanized steel sheets or coils up to 60 inches in width. Each sheet shall be stenciled with manufacturer's name and gauge. Coils of sheet steel shall be stenciled throughout

on 10 foot centers (fabricate with stencils to the outside of the ductwork so they are visible when installed) with manufacturer's name and gauge tolerances in inches:

Gauge No.	Nominal Thickness	Minimum Thickness
26	0.0217	0.0187
24	0.0276	0.0236
22	0.0336	0.0296
20	0.0396	0.0356
18	0.0516	0.0466

- G. Contractor shall comply with this specification section in its entirety. If during a field observation, the engineer of record finds changes have been made without prior written approval, the contractor shall make the applicable changes to comply with this specification at the contractor's expense.
- H. At the discretion of the Engineer of Record, sheet metal gauges and reinforcing may be randomly checked to verify all duct construction is in compliance with this is specification section.
- I. All ductwork and fittings shall have a computer generated label affixed to each section detailing all applicable information including the duct dimensions, gage, reinforcement type/class, and connector type of the systems manufacturer. In addition, galvanizing thickness and country of origin shall be clearly stenciled on each duct section.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and installation instructions in all items specified herein in accordance with Section 23 05 00.
- B. Shop Drawings shall be submitted on all items of sheet metal work specified herein. Shop drawings of ductwork shall be submitted at a minimum scale of 1/4" equal to one foot except that the Congested Areas and all Air Handling Unit Mechanical Rooms shall be submitted at a minimum scale of 1/2" = 1'-0". Provide sections for all Congested Areas and Mechanical Room Plans.
- C. Shop Drawings shall include the reflected ceiling plan, screened back, overlaid onto the floor plan indicating the proposed installation of all light fixtures; ductwork layout; duct fittings; duct connection details; offsets; bottom of duct elevations; all sheet metal dimensions (sizes); overall air device sizes, air device neck sizes, air device air flow quantities, and device type; duct pressure classifications; all mechanical piping; any conflicts discovered and unresolved through the use of transitions and offsets in the available space; turning vanes; manual volume dampers; automatic control dampers; smoke and fire dampers; duct access doors; flexible connections; and all mechanical fans and equipment.
- D. Sheet metal shop drawings shall be overlaid on piping shop drawings and other shop drawings for other portions of work specified in other sections of these specifications for complete coordination of all work prior to commencing with any installation. These Shop Drawings shall not be prepared directly on the Shop Drawings of other trades; they will be separate from all other shop drawings. Coordination Drawings shall be prepared in accordance with Specification Sections 01 30 00

- E. Shop Drawings shall be based on actual field measurements taken at the job site and shall take into consideration all obstacles and be fully coordinated with all piping, conduits, structure, equipment, and general construction features.
- F. Shop Drawings shall be generated by a computer aided design and drafting (CADD) system as a CADD drawing. CADD files with Architectural Backgrounds and Mechanical design drawing files will only be provided when requested, if this privilege has not been previously abused, after a Release of Liability Form has been completed and the Contractor agrees to pay a fee associated with the cost to furnish these files, typically a minimum \$100.00 fee, up to \$500.00, depending on file size. The fee on this project for HVAC ductwork and piping CADD files will be \$100.00.
- G. Include a brochure, with individually assembled cut sheets, and details of all sheet metal fittings, duct construction standards proposed for each system, air volume control devices, and other accessories proposed to be used for job duct construction standards. This shall be done prior to submission or preparation of any sheet metal shop drawings.
- H. Should any ductwork installation commence without approved ductwork shop drawings or written approval by the Engineer of Record, the Contractor assumes all liability, to include all costs, in revising any portion of the sheet metal work that is deemed unacceptable by the Owner's Representative to include any conflicts discovered in installation that could have been resolved through the Shop Drawing process.

1.05 GUARANTEE

- A. The work shall be guaranteed for a period of one (1) year from and after the date of acceptance of the job, "Substantial Completion", against noise, chatter, whistling, or vibration, and be free from pulsation under all conditions of operation. This guarantee shall include defects in material, equipment and workmanship.
- B. After the system is in operation, should these defects occur, they shall either be removed and replaced or reinforced as directed by the Owner's Representative. This shall include repair of damages to building materials related to these deficiencies.

1.06 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored, which has been damaged or defaced, or which has gotten wet during storage or construction shall be rejected.
- B. Prior to ductwork being installed the roof system, or floor above the ductwork, must be sufficiently installed to protect ductwork from rain water entering ductwork. If the building is not dried-in and walls, windows, etc., are not completed, then cover all openings in ducts with securely fastened heavy duty, minimum three (3) mil thick, plastic to protect from rain damage.
- C. Storage and protection of materials shall be in accordance with Section 23 05 00.

PART 2 PRODUCTS

2.01 DUCTWORK

- A. General:
 - 1. All ductwork shown on the Drawings, specified or required for the heating, ventilating, and air conditioning systems, shall be constructed and erected in a first-class workmanlike manner by trained and skilled sheet metal workers.

2. All ducts shall be erected in the general locations shown on the Drawings, but must conform to all structural and finish conditions of the building. Before fabricating any ductwork, Contractor shall check the physical conditions of the job site, and shall make all necessary changes in cross sections, offsets, etc., whether they are specifically indicated or not.
3. Before starting shop drawings or fabrication of any ductwork, the Contractor must have an approved reflected ceiling plan with which he can coordinate location of air outlets, lights, tile patterns, etc.
4. The sizes of ducts indicated on the Drawings are the required net internal air stream dimensions, and where ducts are lined, the sheet metal sizes shall be increased three inches (3") in both dimensions to accommodate the linings (1-1/2" thick lining, unless indicated otherwise). Assume all rectangular ducts are lined unless noted otherwise.
5. Ductwork shall be classified, for construction standards, as follows:
 - a. All ductwork shall be constructed to meet one inch (1") W.G. standards.
6. Except as noted otherwise, ducts, plenums, and casings shall be constructed of new lock forming quality galvanized prime grade steel sheets. The gauges of metal to be used, duct construction details, and the construction and bracing of joints shall be in accordance with the latest edition of the published standards of the ASHRAE Handbook or in accordance with the latest editions of Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) "Duct Construction Standards Manual, Metal and Flexible".
7. Plenum chambers shall be constructed of 18 gauge sheets thoroughly braced with 1-1/2 inch angle irons. All duct panels in rectangular galvanized steel ducts which are 12 inches and wider and which are not lined shall be crossbroken.
8. Make square elbows where shown or required, with factory fabricated double thickness turning vanes. Job fabricated vanes will not be acceptable. Except as otherwise specified or indicated on the drawings, make all other changes in direction with rounded elbows having a centerline radius equal to 1-1/2 times the width of the duct in the plane of the bend.
9. Make transformations in duct shape or dimension with gradual slopes on all sides. Normally, make increases in dimension in the direction of air flow, with a maximum slope of one inch (1") in seven inches (7") on any side. Where conditions prevent the normal slope specified above, a maximum slope of one inch (1") in four inches (4") will be allowed only where conditions necessitate.
10. Where a transition must be made with less slope than that noted above, install single thickness guide vanes to insure proper air flow, and to minimize air pressure drop. Transitions that require less slope than that noted above shall be noted on Shop Drawings, and require review and approval by the Engineer prior to installation.
11. Ducts shall be routed in conjunction with all types of pipes, electrical conduits, ceiling hangers, etc., so as to avoid interferences insofar as possible. When duct penetrations are unavoidable, provide streamline-shaped sleeves around such material penetrations, made airtight at duct surfaces, except that such sleeves are not required at tie rods. When the Contractor believes such penetrations are unavoidable, notify the Owner's Representative for approval prior to commencing with such work. Otherwise all such penetrations are not expected to occur and are not allowed. Such penetrations will not be allowed for the convenience of, or lack of coordination by, the Contractor. Where obstructions necessitate, are approved by the Owner's Representative, and are of a size exceeding 10% of the total duct area, the duct shall be transformed to maintain the same original duct area.

12. Where each duct passes through a fan room wall, it shall be wrapped with not less than 1/2" thick closed cell neoprene tightly fitted to the outer surface of the duct all around and sealed. In lieu of this method, completely fill the annular space between the duct and penetration by packing with fibrous insulation and seal the perimeter of the penetration around the duct, on both sides of the penetration, with a flexible non-hardening sealant, to be fire rated when applicable.
13. All outlets or grilles in ceilings shall be supported rigidly from ceiling construction with suitable adapters or bucks installed as necessary and as shown to insure outlets and grilles will be accurately trued up with ceiling.
14. Ductwork shall be fabricated in a manner to prevent the seam or joints being cut for the installation of grilles or diffusers.
15. All sheet metal ductwork shall be securely hung from the building construction. All ducts shall be hung adjacent to the seam in the duct and shall be secured in a suitable manner to both the duct and the building construction. All vertical riser ducts shall be supported at each floor with angle iron secured to the ducts and set on the structure members. These angles shall be the same size as specified for bracing.
16. All holes in ducts for damper rods and other necessary devices shall be either drilled or machine punched (not pin punched), and shall not be any larger than necessary. All duct openings shall be provided with sheet metal caps if the openings are to be left unconnected for any length of time. All panels of uninsulated ducts twelve inches (12") and larger shall be crossbroken. In general, sheet metal screws shall not be used in duct construction unless the point of the screw is in the air stream unless specifically indicated otherwise elsewhere herein.
17. Manual dampers shall be installed as shown and as required to afford complete control of the air flow in the various duct systems. In rectangular supply ducts, a splitter damper shall be installed at each point where a branch is taken off and additional volume dampers shall be installed where shown or required to achieve the final air balance. No splitter dampers shall be installed in medium pressure ductwork, unless specifically shown on Drawings.
18. Splitter dampers and volume dampers of the "butterfly" type, installed in rectangular ducts, shall be constructed of 16 gauge galvanized steel riveted or welded to square operating rods. Dampers shall have brass, bronze, or approved plastic bearings. The length of any splitter damper blade shall be 1-1/2 times the width of the smaller split in the duct, but shall be not less than twelve inches (12"). Where splitter dampers exceed 12 inches in height two (2) pull rods shall be used. Splitter dampers 12 inches (12") in height or less shall have one (1) pull rod.
19. Butterfly damper blades in round ducts shall be the full width of the duct in which they are installed. Dampers shall be constructed of a minimum 22 gauge metal. Dampers over twelve inches (12") in diameter shall be constructed of 20 gauge metal, have a continuous rod with end bearings opposite the damper handle, and a quadrant type locking handle.
20. The operating rods of all dampers shall be fitted with Young Regulators and the operating head shall be securely fastened in place so as to be accessible in the finished building unless shown otherwise. Operators shall be attached to duct where regulator occurs above a lay-in ceiling. Use a Ventlock No. 555 locking quadrant on accessible concealed splitter dampers. Where dampers occur above or behind plaster or other inaccessible ceilings, walls, chases or furrings, use electronic balancing dampers as specified elsewhere herein. Young Regulator bearings shall also be provided on the opposite end of each operating rod.
21. Behind each ceiling supply outlet, provide and install a turning vane or approved equalizing grid, where noted or scheduled. Where adjustable air pick-ups are

indicated at points branch ducts meet trunk ducts, they shall be Titus AG-45 or approved equal with operator adjustable from the duct exterior.

22. Rectangular opposed blade volume dampers shall be as manufactured by American Warming and Ventilating or Ruskin. Blades shall not exceed 48 inches in length or twelve inches (12") in width, and shall be the opposed interlocking blade type. The blades shall be of not less than No. 16 gauge steel supported on one-half inch (1/2") diameter rustproofed axles. Axle bearings shall be the self-lubricating ferrule type.

B. Low Pressure Ductwork:

1. Rectangular low pressure ducts, for systems designated to be operating at up to one (1) inches W.G., shall be constructed of the following medium gauges:

Largest Dimension of Duct	U.S. Gauge of Metal	Maximum Reinforcement Spacing
Up to 36"	26	5'-0"
37" to 48"	24	5'-0"
49" to 60"	24	4'-0"
61" to 72"	22	4'-0"
73" to 84"	20	4'-0"
85" to 96"	18	4'-0"
Over 96"	18	2'-6"

The above rectangular ducts shall be constructed in accordance with Section 1 the latest edition of the "Duct Manual" published by the Sheet Metal and Air Conditioning Contractors National Association. However, the gauge thickness of the ductwork shall meet that as scheduled above.

2. Round low pressure ducts shall be spiral wound as manufactured by United Sheet Metal Company or have grooved seams with flat snaplock longitudinal seams. Spiral seam round duct gauge thicknesses shall be that standard by the manufacturer for the pressure rating of the system. Gauges for snaplock shop fabricated ducts shall be as follows, without exception:

Largest Dimension of Duct	Gauge of Metal	Gauge of Longitudinal Seams and Fittings
Up thru 8" in Diameter	26	26
9" to 14"	26	24
15" to 26"	24	22
27" to 36"	22	20
37" to 50"	20	18
51" to 60"	18	16

Elbows shall have a centerline radius of 1-1/2 times duct diameter or width and for round ducts may be smooth elbows or 5 piece 90 degree elbows and 3 piece 45 degree elbows. Joints of round ducts shall be slip type with a minimum of three (3) sheet metal screws.

3. All low pressure ductwork shall be externally sealed using water based products to include, United McGill Corporation United Duct Sealer, Hardcast "Iron-Grip 601", Foster 32-19 or Polymer Adhesive Sealant Systems, Inc. "Air Seal No. 11" duct sealer installed in the joints after closure. All sealants shall be U.L. rated. Additionally seal all external transverse joints and fitting connections externally.

4. Low Pressure Duct Supports:
 - a. All horizontal ducts up to and including 40 inches in their greater dimension shall be supported by means of No. 18 U.S. gauge band iron hangers attached to the ducts by means of screws, rivets or clamps, and fastened above to inserts, toggle bolts, beam clamps or other approved means. Duct shall have at least one pair of supports 8'-0" on centers. Clamps shall be used to fasten hangers to reinforcing on sealed ducts.
 - b. Horizontal ducts larger than 40 inches in their greatest dimension shall be supported by means of hanger rods bolted to angle iron trapeze hangers. Duct shall have at least one pair of supports 8'-0" on centers according to the following:

Angle Length	Angle	Rod Diameter
4'-0"	1-1/2" x 1-1/2" x 1/8"	1/4"
6'-0"	1-1/2" x 1-1/2" x 1/8"	1/4"
8'-0"	2" x 2" x 1/8"	5/16"
10'-0"	3" x 3" x 1/8"	3/8"

- c. Vertical ducts shall be supported where they pass through the floor line with 1-1/2" X 1-1/2" X 1/4" angles for ducts up to 60". Above 60" the angles must be increased in strength and sized on an individual basis considering space requirements.
5. All low pressure ductwork shall be reinforced to maintain a maximum reinforcement spacing as scheduled with the rigidity classification as needed to meet the specification construction standard. Reinforcement spacing shall be reduced as required to meet the construction standard specified using the gauge thickness scheduled.

C. Round Flexible Insulated Ductwork:

1. All round flexible insulated ducts, low and high pressure type, shall be factory fabricated and insulated as manufactured by Flexible Technologies or Flexmaster USA, Inc. Flexible ducts shall be equal to Thermaflex factory insulated type "MKE-10" or Flexmaster "Type 3M".
2. Flexible duct thermal conductance shall be based on a 75 Deg.F. mean temperature and an aged condition (not out of the box value). Flexible duct insulation shall be a minimum nominal two inches (2.0") in thickness with a minimum 0.75 lb. density. The completed duct assembly shall have a minimum R-value of 5.0. To verify compliance with the Energy Conservation Code in effect, the minimum R-value of 5.0 will need to be documented on the outside of the jacket to allow field verification of compliance with this requirement.
3. The core liner of the flexible duct system shall be a tri-laminate aluminum foil, made with fiberglass and aluminized polyester, or a PVC coated fiberglass cloth. The outer liner shall be a polyester reinforced aluminized foil jacket.
4. Flexible ducts shall be U.L. Listed in accordance with U.L. 181 as a Class I insulated air duct, and shall comply with NFPA Standard 90A and 90B. Flexible ducts shall have a maximum flame spread of 25 and maximum smoke developed rating of 50.
5. Flexible ducts shall be suitable for operating temperatures of -20 up to 250 Deg.F.

6. Flexible ducts shall be suitable for negative pressures of minus one inch W.G. in sizes up to 16" in diameter; and positive pressures up to 10 inches W.G. for sizes up to 16" in diameter. Maximum operating duct velocity rating shall be a minimum of 4,500-5,500 feet per minute.
7. Maximum vapor transmission rating shall be 0.05 Perms as rated in accordance with ASTM-E-96.
8. Unless otherwise noted, the maximum length of flexible duct shall be limited to five feet (5').
9. Securement of flexible ducts to air devices shall consist of sliding the duct onto the air device collar or connector and securing it with plenum rated nylon or teflon panduit band on the inner liner which shall be U.L rated for the application. Fold insulated outer vapor barrier jacket liner over the first band and secure with a second plenum rated panduit band. Make connection vaportight with a vapor barrier seal using polyester reinforced aluminized duct tape that is two inches (2") wide, wrapped 2 times around the duct, or by the use of a fiberglass mesh wrapped in a similar fashion and coated with a vapor barrier coating, Foster's Vapor Safe 95-90 or 95-96 mastic or Childers CP-38. Coating must adhere to MIL-PRF-19565C with a permeance rating of less than 0.02 perms per ASTM-E-96, procedure B. No cloth backed duct tape is allowed. All duct tapes used shall be acrylic based. All fasteners, adhesives, and duct tape used shall be U.L.rated for the application.

2.02 ACCESS DOORS

- A. Furnish and install hinged, low leakage access doors in ductwork or plenums to provide access to all mixed air plenums, automatic dampers, coils, filters, and elsewhere as detailed on the Drawings.
- B. Where the ducts are insulated, the access doors shall be double skin doors with a minimum one inch (1") of insulation in the door. The insulation shall have a minimum R-value of 5.0. Increase the thickness of the insulation as needed to comply. Where the access door is installed in non-insulated ductwork the access door shall be unlined sheet metal of the same gauge thickness as the duct.
- C. In no case shall access doors be smaller than eight (8") by eight inches (8"). Access doors shall be sized to permit testing or servicing of duct mounted components, such as, for coil cleaning, installation of control devices, resetting of fusible links, filter replacement, etc., as applicable and suitable for the application.
- D. Where duct access doors are above a suspended, normally non-readily accessible ceiling, such as plaster, gypboard or spline type ceilings, Contractor, under this Section of Specifications, shall be responsible for the proper location, and furnishing of, ceiling access doors, or panels, to make duct access doors easily accessed through the ceiling system. Ceiling access doors, or panels, shall be rated, where applicable, to match the fire rating of the ceiling system penetrated. Ceiling access doors, or panels, shall be installed under other Sections of these Specifications. Ceiling access doors, or panels, shall be centered directly beneath duct access doors or immediately adjacent thereto when duct access is through the side of the duct.
- E. All access doors shall be fully double gasketed, door to frame and frame to duct, and include a sash type or compression latches for sizes under eighteen inches (18") by eighteen inches (18"). Use one (1) sash type latch per twelve inches (12") of height or width. Access doors 18" x 18" and larger shall have quarter turn handle latches; provide one handle per 24" section, height or width, of door. As an example, provide two (2) handle type latches for a 48" tall access door.

- F. Provide a minimum of two (2) heavy loose pin hinges for each access door unless indicated otherwise herein. Piano style hinges will be an allowed substitute.
- G. Where the installation conditions prohibit suitable access with hinged access doors, then non-hinged access doors may be used in conjunction with a corrosion resistant cable or chain, of suitable length, attached to the access door and duct.
- H. For duct systems constructed to 2 inches W.G standards, or less, provide standard access doors meeting all requirements specified herein, which have a tested air leakage rating of less than 4.0 CFM at a test pressure of 2 inches W.G., and as manufactured by:
 - 1. Ventlok with hinges and No. 90 or No. 99 latches (less than 18" x 18"), or No. 100 or No. 140 latches (18" x 18" and larger), as applicable, or approved equals by:
 - 2. Ductmate, or
 - 3. Duro Dyne DDIAD-0806, or
 - 4. NCA Manufacturing ADH-T-1, or
 - 5. Pottorff HAD or CAD, or
 - 6. Nailor 08SH with HP Seal, or 0890, or
 - 7. Cesco Products HDG, or
 - 8. Ward Sandwich Style Access Doors, DSA or DDA, for round ductwork.

2.03 DUCT LINER

- A. Where indicated on the Drawings or specified herein, all rectangular ducts shall be lined with Fiberglass mat faced duct liner in the thicknesses, type, and locations as indicated elsewhere herein.
- B. Line all other general building exhaust air ducts within 10'-0" on each side of each in-line exhaust fan with one inch (1") thick liner. Roof mounted exhaust fan ductwork shall also be lined, one inch (1") thickness, but only for the first 10'-0" of ductwork from the roof curb toward the occupied space.
- C. All return, transfer, and relief air ducts shall be lined with one inch (1") thick duct liner.
- D. The liner insulation system shall be one and one-half inches (1.5") in thickness on all conditioned air, heated or cooled, as well as outside air intake ducts, and mixed air plenums to obtain a minimum R-value of 5.0 thereon.
- E. All ductwork systems are required to meet the most recent version of the International Energy Conservation Code.
- F. All duct liners shall comply with NFPA 90A and 90B and ASTM C 1071, Type I, for ducts and Type II for plenums (rigid liner). Liner shall consist of flexible, matt faced insulation made of inorganic glass fibers bonded by a thermosetting resin with an encapsulant edge coating, and shall be a rotary style duct liner product with a water repellent ingredient on the mat face to help keep moisture from penetrating the air stream surface. Other technical requirements shall include:
 - 1. Be suitable for temperatures up to 250 Deg.F. per ASTM C 411.
 - 2. Be suitable for air velocities up to 6,000 FPM per ASTM C 1071 for Type I products and 5000 FPM for Type II products.
 - 3. Water vapor sorption shall be less than 3% by weight per ASTM C 1104.
 - 4. Air stream surface mat facing shall be tested with an EPA registered anti-microbial agent to aid in the prevention of fungal and bacterial growth. Mat face, as treated, shall not support the growth of mold, fungi, or bacteria per ASTM C 1338, ASTM G 21 and ASTM G 22.

5. Does not exceed a Flame Spread of 25 and Smoke Developed and Fuel Contributed of 50 per ASTM E 84, NFPA 225, and UL 723.
 6. Conductance of 0.24 (R-value of 4.2) for a 1.5 PCF or 2.0 PCF duct liner at a 75 Deg.F. mean temperature per ASTM C177 for a one inch (1") thick product.
 7. Greenguard Compliant (Greenguard Environmental Institute).
 8. Noise Reduction Coefficient (NRC) of 0.70 or higher for a one inch (1") thick product and 0.80 for a two inch (2") thick product per ASTM C 423, type A mounting.
- G. All duct liners shall be able to be cleaned in accordance with the North American Insulation Manufacturers Association (NAIMA) "Cleaning Fibrous Glass Insulated Air Duct Systems Recommended Practices".
- H. Liner shall be applied to the inside of rectangular ducts and plenums with fire-resistant adhesive, Fosters 85-60, or 85-65, or Childers CP-127, Hardcast "Seal-Tack" or Ward "Premium Duct Liner Adhesive", or equal, complying with ASTM C 916, completely coating the clean sheet metal. All joints in the insulation shall be "battered" and firmly butted tightly to the adjoining liner using fire resistant adhesive. Where a cut is made for duct taps, etc., the "raw" edge shall be accurately and evenly cut and shall be thoroughly coated with this same fire resistant adhesive.
- I. On ducts over twenty-four inches (24") in width or depth, the liner shall further be secured with mechanical fasteners. Fasteners shall be Graham or Gemco weld pins. "Stick Clips", "Sheet Metal Clips", or other fasteners secured to the ducts by adhesive are not allowed. Fasteners shall be placed on a maximum spacing of eighteen inches (18") and shall be pointed up with fire-resistant adhesive. Fasteners shall not compress the insulation more than 1/8".
- J. Liner shall be accurately cut and ends thoroughly coated with adhesive so that when the duct section is installed, the liner shall make a firmly butted and tightly sealed joint. Provide metal nosings securely installed over transversely oriented liner edges facing the air stream at all fan discharges, at access doors, and at any interval of lined duct preceded by unlined duct.
- K. Where rectangular ducts are lined and adjoins externally insulated rectangular ducts, the two insulations shall be overlapped not less than twenty-four inches (24").
- L. Dimensions given on the Drawings are inside air stream, free area, dimensions only and sheet metal sizes shall be increased in size to maintain these free area dimensions when liner is installed.
- M. All exposed ductwork shall be internally lined unless specifically indicated otherwise.
- N. Refer to Section 23 07 00, Insulation, for further related requirements.
- O. Acceptable liner manufacturer shall be:
1. Certainteed, Tough Gard R with enhanced surface.
 2. Knauf, Rotary Duct Liner E-M with Hydroshield.
 3. Owens Corning, Quiet R Acoustic Duct Liner, Type 150 or equivalent Duct Liner Board.
 4. Johns Manville, Linacoustic RC or R-300.

2.04 GRILLES, REGISTERS, AND DIFFUSERS

- A. Grilles, registers, ceiling outlets, diffusers and other air devices shall be as scheduled on the Drawings and shall be suitable for the intended use.

- B. Provide air devices with sponge rubber or soft felt gaskets at flanges where the devices mate up to a ceiling or wall surface.
- C. If a manufacturer other than the one scheduled is used, the sizes shown on the Drawings shall be checked for performance, noise level or criteria, face velocity, throw, drop, pressure drop, air diffusion, etc., before the submittal is made. Selections shall meet the manufacturers' own published data for the above performance criteria. The throw shall be such that the terminal velocity will be not more than 50 FPM or less than 25 FPM at the point of penetrating the occupancy zone. The occupancy zone is defined as six feet (6') above the finished floor and six inches (6"), or farther, from the walls.
- D. Noise levels shall not exceed those published in current ASHRAE Standards and Guidelines for the type of space being served (N.C. level) or that scheduled.
- E. Locations of outlets on Drawings are approximate and shall be coordinated with other trades to make symmetrical patterns and shall be governed by the established pattern of the lighting fixtures, structure and Architectural Reflected Ceiling Plan (RCP). Air devices shall have margins, frames, and sizes to be compatible with the ceiling and wall systems installed. All color and finishes are subject to final approval by the Architect.
- F. Where called for on the schedule, grilles, registers, ceiling outlets, diffusers and other air devices shall be provided with deflecting devices and manual dampers.
- G. Where indicated on the Drawings, provide a fire rated blanket on the back side of steel ceiling mounted air devices (supply, return, exhaust, etc.).
- H. Where indicated on the Drawings, provide an insulation blanket on the back side (all surface area) of ceiling mounted supply air devices to prevent condensation.
- I. All air devices shall be the standard product of the manufacturer, subject to review by the Architect. Acceptable manufacturers are:
 - 1. Titus, or approved equals only by:
 - 2. Krueger.
 - 3. Nailor.
 - 4. Metal-Aire.
 - 5. Carnes.
 - 6. Price Industries.

2.05 ADHESIVES AND SEALANTS

- A. All adhesives and sealants used on this project must have a Volatile Organic Compound (VOC) content less than that listed in the current South Coast Air Quality Management District (SCAQMD) Rule 1168, and all sealants and fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.
- B. All adhesives and sealants shall meet the most current Leadership in Energy and Environmental Design (LEED™) requirements.

2.06 ELECTRONIC BALANCING DAMPERS

- A. Where balance dampers are to be located above a hard ceiling, or in any inaccessible location, the contractor shall use electronic balancing dampers controlled with an Electronic Balancing Damper Positioner (EBDP) which opens and closes the damper and provides a visual indication of the damper position with a LCD meter.
- B. Each Remote Damper Assembly shall consist of a commercial quality damper actuated by a 12V DC motor with position feedback, a plenum rated cable with RJ-25 connectors

on each end, termination options to control the damper from either a plenum, wall or ceiling location, and a hand held damper positioner that provides DC voltage to open and close the damper while displaying the damper position with the LCD position indicator meter.

- C. Each damper shall be either a round, rectangular, or High Efficiency Takeoff type damper, as applicable to the installation. Round dampers shall consist of a 20 gauge galvanized steel shell and blade with ½" plated steel damper shafts, and 12V DC Motor with position feedback. Rectangular dampers shall consist of a 20 gauge aluminum frame and blade, stainless steel slide, 18 gauge galvanized steel mounting plate for slip in installation, and 12V DC motor with position feedback. High efficiency takeoff dampers shall consist of a galvanized steel takeoff with 20 gauge blade and ½" steel shafts, and 12V DC motor with position feedback. Dampers shall include oil impregnated bronze bushings. Damper actuators shall use less than 0.5 watts of power (20 mA), have a torque capability of 16 lbs-in (maximum), and rotate the damper from 0 - 90 degrees in 12 seconds or less. Feedback shall occur via a proportional voltage signal. Provide low leakage damper blade seals.
- D. Electric Cables shall be plenum rated cable, have modular connectors and be available in lengths up to 1,000 feet. Length of individual cables shall be field verified to insure no field splicing of cables is required. One modular connector shall be attached to each motor and the other end shall include a RJ-25 modular connector that would be installed inside a plenum or at a wall or ceiling receptacle, to be coordinated with the architectural drawings (acceptable locations). Ceiling connections shall be the concealed type similar to Young Regulator Company (YRC) TP -301. Wall connections shall be the suitable for 1- 6 ports and be similar to YRC TP-Wall.
- E. The Positioner (EBDP) shall be used to control all remote electronic balance dampers installed on site by use of ceiling or wall mounted receptacles, a plenum connection or a combination of these options. The Positioner shall be self contained and be a hand held device. Each positioner shall be provided with a high capacity long life lithium battery which shall be easily replaced in the field. Provide one (1) Positioner for each site or building to include one (1) spare battery for each positioner furnished. Positioner shall use a modular RJ-25 connector that plugs into the modular connector served by the 12V DC motor. The positioner battery shall drive the damper motor open and closed. The positioner shall also house the LCD display that provides precise damper position indication throughout the range of movement via a proportional voltage feedback signal from the motor.
- F. Acceptable Manufacturers:
 - 1. Young Regulator.
 - 2. Greenheck.
 - 3. Metropolitan Air Technology (MAT).
 - 4. Or other approved equals.

2.07 TURNING VANES

- A. Turning vanes shall be Harper double wall turning vanes fabricated from the same material as the duct.
- B. Turning vane front and back panels shall be securely locked together with adequate crimping to prevent twisting of vane. Vanes shall be capable of withstanding 250 pounds of tensile load when secured according to the manufacturer's instructions.
- C. Rails for mounting vanes shall have self locking, friction fit tabs designed to facilitate proper alignment of vanes. Tab spacing shall be as specified in Figure 4-3 of the 2005

SMACNA Manual, "HVAC Duct Construction Standards, Metal & Flexible", Third Edition Standard. Rail systems with non-compliant tab spacing shall not be accepted.

- D. Acoustical Turning Vanes shall be used in applications that require quiet operating systems. Mounting rails shall have friction insert tabs that align the vanes automatically. These shall only be required where designated on the Drawings.
- E. Approved Manufacturers:
- F. Ductmate Industries PRO-Rail Turning Vane or approved equals.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all ductwork and equipment as indicated on the Drawings in full accordance with these specifications including foundations, hangers, supports, etc.
- B. Seal all ductwork as specified, pressure test and repair leaks.
- C. Install all air intake, relief and exhaust air hoods on continuous neoprene strips set level on top of wood nailers of the specified roof curbs. Hoods shall be secured at 8" O.C. to the curbs with corrosion resistant screws if not secured by other fasteners as specified. Flash and counterflash to prevent water leakage through the overall roofing system.
- D. Install all duct mounted components such as heating coils, electric or water type, sound attenuators, air terminals, etc. in accordance with the manufacturers recommendations.
- E. Should defects or installation deficiencies become apparent, or are observed, after the systems have been in operation, the deficient components shall be removed and replaced or reinforced as directed by the Owner's Representative.

3.02 CLEANING OF DUCT SYSTEMS

- A. Before the grilles or diffusers are installed, all fans and air conditioning units shall be operated and all debris and foreign matter shall be removed from the ducts.
- B. The air conditioning units shall be thoroughly cleaned, and the drain pans shall be thoroughly cleaned and flushed out with a hose; the filters shall be thoroughly cleaned and the grilles shall then be installed.
- C. Insure all duct openings are capped and sealed during construction when additions are not being made.

3.03 FILTERS

- A. No air moving equipment may be operated at any time without filters being fully installed in equipment.
- B. Provide a minimum of three (3) spare sets of two inch (2") thick, medium efficiency, pleated media filters for all air handling and fan coil units, as well as for filter return air grilles where scheduled, in addition to manufacturer furnished filters specified elsewhere herein. Where other sections of these specifications require one inch (1") or four inch (4") thick filters, or other types of filters, provide spare sets of matching thickness and type.
- C. Additionally replace filters during construction as directed by the Owner's Representative.
- D. Install one (1) new complete set of filters, as directed by the Test and Balance (TAB) Firm, just prior to performance of TAB work.

Florence Recreation Center Renovation

- E. Install one (1) new set of filters at "Substantial Completion" of the project.
- F. Where the minimum number of filter sets are not used for the aforementioned purposes, provide the left over filters to the Owner for maintenance stock.
- G. Document, in writing, when each filter change-out occurs.

END OF SECTION

SECTION 23 81 27

DUCT-FREE SPLIT SYSTEMS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Comply with General Requirements in Division 1, and all referenced documents.
- B. Comply with all other Sections as applicable.

1.02 SYSTEM DESCRIPTION

- A. The work shall include installing remote air cooled condensing units and duct-free split system direct expansion (DX) evaporator fan coil units where indicated on the Drawings to meet scheduled capacities.
- B. Contractor shall connect all refrigerant piping, refrigerant specialties, required controls, starters, field installed accessories, appurtenances, insulation, hangers, supports, foundations, etc. to make a complete and operational system.

1.03 QUALITY ASSURANCE

- A. All equipment and materials shall be new and of the best quality, complying with all standards specified herein.
- B. All equipment and materials shall be installed by technicians trained to perform this type of work, having had experience with similar type of equipment, and shall be in full accordance with the recommendations of the manufacturer.

1.04 SUBMITTALS

- A. Product Data: Submit complete manufacturer's descriptive literature, installation instructions, wiring diagrams, piping connections, and matched capacity ratings at specified conditions, accounting for refrigerant line size, routing and length of run. Indicate all accessories furnished, sizing of refrigerant piping, and other descriptive literature to verify conformance to these specifications.
- B. Indicate on submittal the calendar date for projected delivery of all equipment to the project site.
- C. Submit system piping schematic with recommended pipe sizes and proposed equipment configuration.
- D. Submit in accordance with Division 1.

1.05 PRODUCT HANDLING

- A. Cover and protect material in transit and at site. Material not properly protected and stored and which is damaged or defaced during transit or storage shall be rejected and replaced at no cost.
- B. Storage and protection of materials shall be in accordance with General Requirements and Division 1.

1.06 INSTALLATION, OPERATING, AND MAINTENANCE MANUALS

- A. Furnish all installation manuals required by an experienced and trained technician for proper installation of equipment. Manuals shall be provided with equipment and be attached thereto.
- B. Furnish three (3) copies of operations and maintenance brochures, including spare parts list, at "Substantial Completion".

PART 2 PRODUCTS

2.01 DUCT-FREE SPLIT SYSTEM FAN COIL UNITS

- A. Furnish and install Duct-Free Split System Fan Coil Units as indicated and located on the Drawings. Equipment shall be manufactured by EMI, Trane, Carrier or Mitsubishi, and shall be of capacities, characteristics, sizes, etc., as indicated and scheduled on the Drawings, with the following features:
 - 1. Microprocessor controls.
 - 2. Self-diagnostics, including compressor drive, indoor fan, and reversing valve malfunction tests.
 - 3. Restart function for automatic start after a power failure.
 - 4. Automatic air sweep.
 - 5. Mounting bracket and template.
 - 6. 3-Speed fan motor.
 - 7. Easy-to-remove cleanable filters.
 - 8. Accessories as scheduled..
 - 9. Wall mounted thermostat supplied by manufacturer.
 - 10. Built-in condensate pump.

2.02 AIR COOLED CONDENSER

- A. Furnish air cooled condenser as scheduled. Brass service valves with refrigerant line fittings and service ports shall be located in the exterior of the unit. The unit shall be properly assembled and tested at the factory. It shall be designed for use with Refrigerant 410a. Units shall be as manufactured and matched to the indoor unit.
- B. Performance: Capacities shall be as scheduled, to be combination ratings for matched indoor coil and outdoor condensing unit installation shown including accounting for refrigerant line losses.
- C. Condensing coils shall be made of copper tubes with aluminum fin construction and shall be warranted for 5 years. Coils shall have aluminum plate fins, mechanically bonded to the coil tubes. Coils shall be provided with the manufacturer's furnished, field or factory installed, condenser coil air inlet hail and vandal guards. Hardware cloth or flat expanded metal is not acceptable. Guards shall be baked enamel painted steel, PVC coated steel or other approved corrosion resistant metal.
- D. Condenser Fans and Motors: Units shall be furnished with direct driven, propeller-type fans. Condenser fan motors shall have inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a corrosion resistant metal safety guard.
- E. Compressor shall be of the welded-hermetic type with internal vibration isolation. Compressor motor shall have both thermal and current sensitive overload devices. Start assist device shall be standard on single phase units if the refrigerant piping is over 50 feet in total length. Compressor shall be equipped with a crankcase heater and have internal high pressure protection.

- F. Controls and protective devices shall include a liquid line low- pressure switch, manual reset high pressure switch, suction line accumulator and pressure relief device. Control wiring terminal board shall be designed to match indoor unit terminal board and accessory thermostat terminals for standardized point-to-point connectors. An automatic defrost control shall be included to accomplish defrosting (only if coil saturated suction temperature indicated freezing temperatures) every 90 minutes for a period of not more than 10 minutes.
- G. Accessories shall include Solid-State Time Guard, Liquid Line Filter Dryer, sight glass, Flare-To-Compatible Coupler, and a head pressure controller to allow operation down to 20 Deg.F. ambient temperature.
- H. The air cooled condenser shall carry the full one year warranty on the entire unit, plus, an additional four year warranty on the motor compressor unit.
- I. All condensing units shall have a minimum 14 .0 SEER (ARI) at combination rating with matched DX-coil.

PART 3 PART 3 - EXECUTION

3.01 DELIVERY AND PROTECTION

- A. Deliver all equipment to each site. All equipment shall be handled carefully to avoid damage and be protected from exposure to the weather and dirt. All equipment shall be examined upon delivery to the site and evidence of abuse, damage, or exposure to weather and dirt shall be grounds for refusal to accept individual pieces of equipment. Rejected items shall be replaced promptly at no cost.
- B. During construction, take all steps necessary to protect equipment from damage or vandalism. All damage or vandalism shall be repaired at no cost to the Owner.

3.02 AIR COOLED CONDENSER AND FAN COIL UNIT INSTALLATION

- A. Install condenser level on concrete pad where shown with vibration pads.
- B. Route refrigerant piping and make connections to DX coils as recommended by the unit manufacturer.
- C. Furnish and install all refrigerant piping specialties including, but not limited to, thermal expansion valves, sight glasses, and filter dryers.
- D. Furnish and install all factory furnished accessories not factory installed.
- E. Charge all refrigerant piping systems and equipment to maintain a fully operating refrigerant charge.
- F. Verify correct power and control wiring installation. Measure operating voltage and current, check proper rotation of motors, and verify correct settings of safety devices and controls
- G. Clean indoor and outdoor coils, including dust and lint, clean condensate pan on each fan coil unit section after the evaporator coil is clean.

3.03 REFRIGERATION PIPING

- A. Piping shall be Type "K" copper, ACR cleaned and capped. All fittings shall be long radius and shall be cleaned and de-greased before use.
- B. Refer to Section 23 23 00, Refrigerant Piping.

3.04 OPERATING PROCEDURES AND REQUIREMENTS

- A. Operating and service instructions, three (3) copies, in illustrated and bound form shall be furnished by the manufacturer at "Substantial Completion".
- B. The manufacturer of each item of equipment shall provide complete wiring diagrams to the Electrical Contractor and shall provide drawings indicating all required external wiring and arrangements of connections.

3.05 WARRANTY

- A. Transfer Warranty to Owner for a full one year period after "Substantial Completion".
- B. Transfer any and all other warranties as applicable over to the Owner at "Substantial Completion", including extended 4-year compressor warranties, as applicable, on refrigeration equipment.

END OF SECTION

SECTION 26 00 01

GENERAL PROVISIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This Division and all Electrical sections contained hereinafter are subject to the Contract Documents of Division 1 whether attached or not, the various Divisions of the General Construction specifications and Division 23 00 00 of Mechanical Construction specifications and respective plans.
- B. All drawings, material in other Division of these specifications, addenda, and other pertinent documents are considered to be a part of the technical requirements of this Division of the specifications insofar as they are applicable.
- C. The material contained in this section shall be applicable to other sections of the specifications under this Division.

1.02 SCOPE OF WORK

- A. This Division and all electrical sections of the specifications include all labor and material to complete the entire electrical systems as specified and shown on the Drawings.
- B. All work shown and specified shall be completely installed and connected in a workmanlike manner by mechanics properly qualified to perform the work required. All work shall be left in a satisfactory operating condition as determined by the Owner and/or his representative.
- C. Provide all services and perform all operations required in connection with or properly incidental to the construction of complete and fully operating systems with all accessories as herein specified and/or shown on the Drawings.

1.03 GENERAL

- A. The accompanying plans show diagrammatically the location of the various light fixtures, devices, conduits and equipment items, and methods of connecting and controlling them. It is not intended to show every connection in detail or all fittings required for a complete system. The Contractor shall carefully lay out his work at the site to conform to the conditions, to avoid obstructions and provide proper routing of raceways. Exact locations of light fixtures, devices, equipment, and connections thereto shall be determined by reference to the accompanying Plans, etc., by measurement at the building, and in cooperation with other Contractors and Sub-Contractors, and in all cases shall be subject to the approval of the Owner's representative. Minor relocations necessitated by the conditions at the site or directed by the Owner's representative shall be made without any additional cost to the Owner.
- B. These specifications and the accompanying drawings are intended to describe and illustrate systems which will not interfere with the structures, which will fit into available spaces, and which will insure complete and satisfactorily operating installations. The Contractor shall be responsible for the proper fittings of his material and apparatus into the building and shall prepare installation drawings for all critical areas illustrating the installation of his work as related to the work of all other trades. Interferences with other trades or with the building structures shall be corrected by the Contractor before the work proceeds. Should any changes become necessary on account of his failure to comply with these stipulations, the Contractor shall make such necessary changes at his own expense.

- C. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted on the drawings.
- D. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction may be required for work indicated or specified in this section or work specified in other sections, it shall be the responsibility of the Contractor to provide same as well as to provide material and equipment usually furnished with such systems or required to complete the installation.
- E. The Contractor, by submitting a bid on this work, sets forth that he has the necessary technical training and ability and that he will install his work in a satisfactory manner which is up to the best standards of the trade, complete and in good working order. If any of the requirements of the Drawings and Specifications are impossible to perform, or if the installation when made in accordance with such requirements will not perform satisfactorily, he shall report same to the Owner's Representative promptly after discovery of the discrepancy.
- F. No extra compensation will be allowed for extra work or changes caused by failure to comply with the above requirements.

1.04 INSPECTION OF THE SITE

- A. The Contractor shall visit the site, verifying all existing items indicated on the Drawings or specified, and familiarize himself with the existing work conditions, hazards, grades, actual formations, soil, conditions, and local requirements. The submission of bids shall be deemed evidence of such visit.
- B. All proposals shall take these existing conditions into consideration, and the lack of specific information on the Drawings shall not relieve the Contractor of any responsibility.
- C. All site visits shall be coordinated and scheduled with the Owner.

1.05 CUTTING AND PATCHING

- A. When cutting or patching becomes necessary to permit the installation of any work under this contract, or should it become necessary to repair any defects that may appear in patching up to the expiration of the guarantee, such cutting shall be done under the supervision of the Architect by the trade or Contractor whose work is to be disturbed. After the necessary work has been completed, damage shall be repaired by the Contractor or trade whose work has been disturbed. The cost of all such cutting and patching shall be paid by the Contractor requiring it to be done. Refer to Section 01045.
- B. This Contractor shall do all necessary cutting and drilling of present walls, floors, ceilings, etc. for the installation of new work or for modifications to the existing work, but no structural work shall be cut unless specifically approved by the Architect. Patching and painting of services as required shall be by the General Contractor unless specified otherwise hereinafter.
- C. Locations of the various existing services, walls, and equipment to be altered, removed or connected to have been taken from plans of the existing building and other substantially reliable sources and are offered as general guide only, without guarantee as to their accuracy. This Contractor shall examine the site and shall verify to his own satisfaction the location of all existing work and shall adequately inform himself as to their relation to and effect on the work before entering into a contract. Submission of a bid shall constitute evidence that the submitting Contractor has inspected the site of the proposed work.
- D. The Contractor shall examine the existing building and plans for the new work and note the sizes of the openings available for and be responsible for any cutting, patching, and alterations required to place new equipment in the building.

- E. Where walls, acoustical tile, suspended ceilings, etc., not scheduled to be re-worked, or re-finished under the general contract are damaged during installation of new raceways, or other work, etc., such walls, tiles, etc., shall be replaced by the General Contractor at the expense of this Contractor.
- F. All damage done to the existing equipment, services, etc., incurred in the execution of this contract shall be repaired and restored to its original conditions by the Contractor.
- G. Holes through concrete shall be drilled with "Mole", or "Core-It", or equal diamond point hole saw.

1.06 DEMOLITION OF EXISTING EQUIPMENT

- A. Certain types of equipment will be retained by the Owner. The Owner will provide a list of all such salvage items. Before removal of any equipment, contact the Architect, who will determine the disposition. Equipment designated to be salvaged and remain the property of the Owner shall be carefully removed to prevent damage and delivered to a location on the site as directed by the Architect. Any equipment not retained by the Owner shall become the property of the Contractor and shall be removed from the premises.
- B. Contractor shall visit the site and verify all outlets, devices, wall switches, light fixtures, etc., that are to be removed due to remodeling work and building additions.
- C. The attendant raceways, hangers, wiring, foundations, etc., of those items of existing equipment to be removed and not intended for reuse, shall also be removed in their entirety. No raceways, hangers, etc., shall be abandoned in place except those raceways concealed in existing walls or buried below grade.

1.07 CODE REQUIREMENTS

- A. All work shall comply with the provisions of these specifications, as illustrated on the accompanying drawings, or as directed by the Architect, and shall satisfy all applicable local codes, ordinances, or regulations of the governing bodies, and all authorities having jurisdiction over the work, or services thereto. In all cases where alterations to, or deviations from, the drawings and specifications are required by the authority having jurisdiction, report the same in writing to the Architect and secure his approval before proceeding. Upon completion of the work, furnish a statement from the inspecting authority stating that the installation has been accepted and approved. Provide complete utility service connections as directed, and submit, as required, all necessary drawings; secure all permits and inspections necessary in connection with the work, and pay all legal fees on account thereof. In the absence of other applicable local codes, acceptable to the Architect, the National Electric Code shall apply to this work.

1.08 RECORD DRAWINGS

- A. The Contractor shall, during the execution of the work, maintain a complete set of drawings upon which all locations of equipment, panels, and all deviations and/or changes in the work shall be recorded. These "Record" drawings shall be delivered to the Architect in good condition upon the completion and acceptance of the work and before final payment is made.
- B. Refer to Section 01720.

1.09 RECORDS AND INSTRUCTIONS FOR OWNER

- A. The Electrical Contractor shall accumulate during the job's progress the following sets, prepared in neat brochures or packet folders and turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:
 - 1. All warranties and guarantees and manufacturer's directions on equipment and material covered by the Contractor.
 - 2. Approved equipment brochures, wiring diagrams and control diagrams.
 - 3. Copies of reviewed Shop Drawings.
 - 4. Operating instructions for all systems. Operating instructions shall include recommended maintenance procedures.
 - 5. Any and all other data and/or drawings required during construction.
 - 6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
- B. All of the above data shall be submitted to the Architect/Engineer for review at such time as the Contractor makes application for final payment, but in no case less than two weeks before final inspection.
- C. The Electrical Contractor shall also give not less than two (2) days of operating instructions, during the adjustment and testing period, to the Owner's operating personnel in order to familiarize them with the proper care and operation of the equipment. The written operating instructions referred to in paragraph above shall be used as a basis for this on-the-job instruction.
- D. Refer to Section 01720.

1.10 SHOP DRAWINGS AND SUBMITTALS

- A. The Contractor shall submit to the Architect, shop drawings and catalog data on all equipment and materials designated on the Drawings and specified herein.
- B. The submittal will be reviewed for compliance with general requirements of design and arrangement only; it is not a contract document and acknowledgement of compliance does not relieve the Contractor from responsibility for performance of the work in compliance with all provisions and requirements of the Contract Documents. Job measurements and the coordination of all the dimensions for proper fit of all parts of the work and performance of all equipment supplies to meet specification requirements are and remain specific responsibilities of the Contractor.
- C. Shop Drawings shall be furnished by the Contractor for the work involved after receiving approval on the make and type of material and in sufficient time so that no delay or changes will be caused. This is done in order to facilitate progress on the job, and failure on the part of the Contractor to comply shall render him liable to stand the expense of any and all delays, changes in construction, etc., occasioned by his failure to provide the necessary detailed drawings. Also, if the Contractor fails to comply with this provision, the Architect reserves the right to go directly to the manufacturer he selects and secure any details he might deem necessary, and should there be any charges in connection with this, they shall be borne by the Contractor.
- D. The Shop Drawings submitted shall not consist of manufacturers' catalogues or tear sheet therefrom that contain no indication of the exact item offered. Rather, the submission on individual items shall designate the exact item offered.
- E. The Shop Drawings are not intended to cover detailed quantitative lists of electrical specialties, and similar items, as the plans and specifications illustrate and describe those

items, and it is the Contractor's responsibility to procure the proper sizes and quantities required to comply with the established requirements.

- F. Any Shop Drawings prepared to illustrate how equipment can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions, and obtained any approval thereon shall not relieve the Contractor of responsibility in the event the material cannot be installed as shown on those Drawings.
- G. Various material submissions of such as raceways, switches, panelboards, and related items shall be assembled in brochures or in other suitable package form and shall not be submitted in a multiplicity of loose sheets.
- H. Each Contractor shall process his submitted data to insure that it conforms to the requirements of the plans and specifications and that there are no omissions and/or duplications.
- I. Shop Drawings shall be accompanied by certification from this Contractor that Shop Drawings have been checked by him for compliance with Contract Drawings.

1.11 PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES

- A. Seal voids around ducts and pipes penetrating fire-rated assemblies and partitions using approved fire-stopping materials and methods in accordance with provisions in Section 07270.

1.12 CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

- A. All equipment furnished under other Divisions of the specification requiring service connections shall be connected by this Contractor. Materials and labor required for the connection of this equipment shall be furnished under Division 16. The respective supplier shall furnish proper roughing-in diagrams for the installation of these items. All items shall be roughed-in and connected in strict accordance therewith. All equipment requiring connection may not be specified herein, but may be included in other Division documents. This Contractor shall ascertain for himself all equipment so specified is included as part of his work.
- B. Refer to Section 26 05 19.

1.13 DRAWINGS

- A. The drawings show diagrammatically the locations of the various conduits, fixtures, and equipment, and the method of connecting and controlling them. It is not intended to show every connection in detail and all fittings required for a complete system. The systems shall include, but are not limited to, the items shown on the drawings. Exact locations of these items shall be determined by reference to the general plans and measurements at the building and in cooperation with other trades and, in all cases, shall be subject to the approval of the Architect. The Architect reserves the right to make any reasonable change in the location of any of this work without additional cost to the Owner.
- B. Should any changes be deemed necessary in items shown on the contract drawings, the shop drawings, descriptions, and the reason for the proposed changes shall be submitted to the Architect for approval.
- C. Exceptions and inconsistencies in plans and specifications shall be brought to the Architect's attention before bids are submitted; otherwise, the Contractor shall be responsible for the cost of any and all changes and additions that may be necessary to accommodate his particular apparatus.

- D. Lay out all work maintaining all lines, grades, and dimensions according to these drawings with due consideration for other trades and verify all dimensions at the site prior to any fabrication or installation; should any conflict develop or installation be impractical, the Architect shall be notified before any installation or fabrication and the existing conditions shall be investigated and proper changes effected without any additional cost.
- E. Titles of Sections and Paragraphs in these specifications are introduced merely for convenience and are not to be construed as a correct or complete segregation or tabulation of the various units of material and/or work. The Architect does not assume any responsibility, either direct or implied, for omissions or duplications by the Contractor due to real or alleged error in the arrangement of matter in the Contract Documents.

1.14 COOPERATION

- A. All work under these specifications shall be accomplished in conjunction with other trades on this project in a manner which will allow each trade adequate time at the proper stage of construction to fulfill his work.
- B. Maintaining contact and being familiar with the progress of the general construction and the timely installation of sleeves and inserts, etc., before concrete is placed shall be the responsibility of this trade as will the installation of the required systems in their several stages, at the proper time to expedite this contract and avoid unnecessary delays in the progress of other contracts.
- C. Should any question arise between trades as to the placing of lines, ducts, conduits, or equipment, or should it appear desirable to remove any general construction which would affect the appearance or strength of the structure, reference shall be made to the Architect for instructions.

1.15 MATERIALS AND EQUIPMENT

- A. All materials purchased shall be new.
- B. Space allocations in electrical spaces are based on equipment scheduled in each case. Should the Contractor offer equipment of another make, he shall verify that such equipment will fit in the spaces allowed.
- C. Manufacturers' names are listed herein to establish a standard. The products of other manufacturers will be acceptable; if, in the opinion of the Architect, the substitute material is of a quality as good or better than the material specified, and will serve with equal efficiency and dependability, the purpose for which the items specified were intended.
- D. It is fully the Contractor's responsibility to assemble and submit sufficient technical information to fully illustrate that the material or equipment proposed for substitution is equal or superior as the Architect or his Engineer is under no obligation to perform the service for the Contractor. The proposal shall be accompanied by manufacturers' engineering data, specification sheet, and a sample, if practical or if requested. In no event shall a proposal for substitution be cause for delay of work.
- E. Should a substitution be accepted under the above provisions, and should the substitution prove defective or otherwise unsatisfactory for the intended service, within the warranty period, the Contractor shall replace the substitution with the equipment or material specified, and on which the specifications required him to base his proposal.

1.16 STORAGE AND PROTECTION OF MATERIALS

- A. This Contractor shall provide his own storage space for protection and storage of his materials and assume complete responsibility for all losses due to any cause whatsoever.

All storage shall be within the property lines of the building site, and/or as directed by the Owner's representative. In no case shall storage interfere with traffic conditions in any public or project thoroughfare.

- B. All work and material shall be protected at all times. This Contractor shall make good any damage caused, either directly or indirectly, by his workmen. He shall be responsible for safe handling of all electrical equipment and shall replace, without charge, all items damaged prior to acceptance by the Owner.

1.17 SCHEDULE OF WORK, CONTINUATION OF SERVICES

- A. The Contractor shall realize that the present building must continue in operation during the construction period, except as the Architect and the Owner may direct otherwise.
- B. The work under the various sections must be expedited and close coordination will be required in execution of the work. The various Contractors shall perform their work at such times as directed so as to insure meeting scheduled completion dates, and to avoid delaying any other Contractor. The Architect will set up completion dates, schedule the times of work in the various areas involved, etc. This Contractor shall cooperate in establishing these times and locations and shall process his work so as to insure the proper execution of it.
- C. Under no conditions shall any work be done in the present building that would interfere with its natural use during the normal hours of occupancy, unless special permission is granted by the Owner. This is particularly applicable where new connections are to be made to present services or items of equipment in the building or where present equipment items in the building are to be relocated or modified in any way.
- D. Existing utility systems shall continue to function with a minimum of interruptions in service. This Contractor shall install any temporary lines, connections, etc., required to place and maintain the electrical systems in operation unless otherwise directed by the Architect.
- E. Arrange for and provide temporary electric and telephone services to the building where new construction conflicts with existing utility locations.

1.18 CLEANING UP

- A. This Contractor shall be responsible for cleaning up his work as specified in the General Requirements of these Specifications.

1.19 FINAL INSPECTION

- A. Schedule: Upon completion of the Contract, there shall be a final inspection of the completed installation. Prior to this inspection, all work under this Division shall have been completed, tested, and balanced and adjusted in final operating condition and the test report shall have been submitted to and approved by the Owner's Representative.
- B. Personnel: A qualified person representing the Contractor must be present at this final inspection to demonstrate the systems and prove the performance of the equipment.

1.20 CERTIFICATIONS

- A. Before receiving final payment, the Contractor shall certify that all equipment furnished and all work done is in compliance with all applicable codes mentioned in these Specifications.
- B. B. Furnish, at the completion of the job, a final Inspection Certificate from the local inspecting authority.

1.21 GUARANTEE

- A. The guarantee provision of this specification requires prompt replacement of all defective workmanship and materials occurring within one year of final job acceptance. This includes all work required to remove and replace the defective item and to make all necessary adjustments to restore the entire installation to its original specified operating condition and finish at the time of acceptance. The Contractor shall also guarantee that the performance of all equipment furnished and/or installed under this Division of the specifications shall be at least equal to the performance as called for in the specifications and as stated in the equipment submittals. Should there be indication that the equipment and installation is not producing the intended conditions, the Contractor shall make further tests as the Engineer may direct to demonstrate that the equipment installed meets the specifications. If there is indication that the equipment does not meet the specifications, the Contractor shall, at his expense, institute a program to demonstrate the adequacy of the installation. This program shall include all necessary testing and testing equipment. Should the Contractor not have the equipment or technical skill to perform the tests, it shall be his responsibility to provide recognized experts to perform the tests and shall provide certified laboratory tests, certified factory reports and work sheets, or other certified data to support results of any tests required.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Provide systems of wires and cables for electric power, signaling and control.
- B. Related work specified in other sections
 - 1. 26 00 01 - General Provisions
 - 2. 26 05 20 - Cable Connections
 - 3. 26 05 23 - Control Voltage Electrical Power Cables
 - 4. 26 05 32 - Raceways
 - 5. 26 05 33 - Raceway and Boxes for Electrical Systems

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 REFERENCED STANDARDS

- A. ICEA 5-61-402 Thermoplastic Insulated Wire and Cable
- B. ICEA 5-66-524 Cross Linked Thermosetting Polyethylene Insulated Wires and Cables
- C. ICEA 5-68-516 Ethylene Propylene Rubber Insulated Wire and Cable
- D. ICEA 5-19-81 Rubber Insulated Wire and Cable
- E. ANSI 1581 Standard of Electrical Wires, Cables, and Flexible Cords.
- F. UL 83 Thermoplastic Insulated Wires and Cables
- G. UL 1569 Metal Clad Cables
- H. ASTM B3 Standard Specification for Soft or annealed Copper Wire
- I. ASTM B8 Standard Specification for Concentric Lay Standard Copper Conductors

1.05 SUBMITTALS

- A. Where products are of a manufacturer other than listed as acceptable manufacturers, submit manufacturer's product literature completely describing conductors and cable assemblies and evidence of U.L. Listing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver conductors and cable assemblies to the project in the manufacturer's standard reels or boxes marked with conductor material, insulation type, conductor size and U.L. Label.
- B. Store conductors and cable assemblies in a clean, dry location to prevent damage from moisture, dust, personnel and equipment.
- C. Handle conductors and cables in a manner to prevent damage to conductor, insulation, jackets, and identifying markings.

1.07 MANUFACTURERS

- A. The material shall be the product of a manufacturer with a minimum of ten years experience in the manufacture of similar material.
- B. Acceptable Manufacturers:
 - 1. AFC Cable Systems.
 - 2. Cerro Wire, Inc.
 - 3. General Cable
 - 4. Southwire Company
 - 5. Okonite Company

1.08 WARRANTY

- A. The material shall be warranted to be free from defect and in proper working order for one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 CONDUCTORS

- A. Copper Conductors
 - 1. Conductors shall be copper unless specifically noted otherwise on the Drawings.
 - 2. Copper conductors shall be soft drawn annealed copper, minimum conductivity 98% of pure copper per ASTM ASTM-B3.
 - 3. Sizes No. 10 AWG and smaller shall be solid conductor, single strand.
 - 4. Sizes No. 8 AWG and larger shall be concentric lay Class B stranding.
 - 5. Shall conform to the Conductor Properties proscribed in the NEC.
- B. Insulation
 - 1. Type THWN: 600 volt moisture and heat resistant thermoplastic rated 75 Deg.C. in wet or dry.
 - 2. Type THWN-2: 600 volt moisture and heat resistant thermoplastic rated 90 Deg.C. in wet or dry locations.
 - 3. Type XHHW: 600 volt moisture resistant cross linked polyethylene rated 75 Deg.C. in wet or dry locations.
 - 4. Type XHHW-2: 600 volt moisture resistant cross linked polyethylene rated 90 Deg.C. in wet or dry locations.
- C. Cable Assemblies:
 - 1. Type MC Branch Circuit Cable: 600 volt, Type THHN/THWN conductors size 12 AWG through 10 AWG, including a green insulated grounding conductor, with steel interlocked armor applied over the assembly.

PART 3 EXECUTION

3.01 USES PERMITTED

- A. Unless specifically noted on the drawings, permitted by the NEC and local codes and ordinances, wiring shall be Types THWN-2 or XHHW-2 installed in metal raceways as specified in 26 05 32, Raceways.
- B. For final connections from junction boxes mounted on the building structure to recessed lighting fixtures. Type MC cable assemblies shall be permitted, with the cable assembly length not to exceed six feet and with supports as required by the NEC. Fixture-to-fixture chain wiring is not permitted.
- C. Where specifically noted on the drawings, permitted by the NEC and local ordinances, Type MC Branch Circuit cable shall be permitted for branch circuit wiring and where concealed in stud spaces of dry wall partitions. NEC requirements for supporting from the structure independent of ceiling systems or ceiling support wires will be strictly mandated.

3.02 COLOR CODING

- A. Where available, insulation shall be color coded by factory pigmentation for each phase and each voltage system employed on the project.
- B. 120/208 and 120/240 volt systems:
 - 1. Phase A - Black
 - 2. Phase B - Red
 - 3. Phase C - Blue
 - 4. Neutral - White
 - 5. Ground - Green
- C. Switch legs, travelers and special systems shall be continuous color scheme throughout the project as selected by the Contractor.
- D. Where factory pigmentation is not available, code conductors with 1-1/2" colored tape band at each terminal and at each pull or junction box.

3.03 GROUNDING CONDUCTORS

- A. All branch circuits and feeders shall include an insulated equipment grounding conductor. Raceway systems shall not be used as the sole equipment grounding path without specific approval.

3.04 MULTIWIRE BRANCH CIRCUITS

- A. Multiwire branch circuits shall not be permitted unless required by the device served, such as for connection to modular furniture systems or track lighting systems.
- B. Where multiwire branch circuits are required, branch circuit breakers shall be two or three pole with common trip and one handle.

3.05 MINIMUM SIZE

- A. Conductors shall be of the minimum size shown on the drawings, lighting and power branch circuit wiring shall be minimum No.12 AWG.
- B. Feeder circuit wiring shall be sized to limit the effect of voltage drop, based on the actual installed conductor length to limit voltage drop to 2% of nominal system voltage.

- C. Branch circuit wiring shall be size to limit the effect of voltage drop, based on the actual installed conductor length, to limit voltage drop to 3% or less of nominal system voltage.
- D. Circuits shall be grouped in raceways and grouped together when passing through enclosures to have phases and neutral grouped together to minimize circuit reactance.

3.06 INSTALLATION

- A. Examine the system in which the conductors are to be installed for defects in equipment and installation which may cause damage to the conductors, insulation, or jackets.
- B. Pull a swab or mandrel through conduit systems immediately before pulling conductors to insure a full bore, clean raceway system.
- C. Do not exceed the conductor manufacturer's maximum pulling force or minimum bending radius.
- D. Use pulling lubricant compound where necessary and recommended by the manufacturer.
- E. Conductors or cables which have insulation or jackets damaged in the pulling process shall be removed and replace with new material.

3.07 FIELD QUALITY CONTROL

- A. Test all wiring insulation with a megohm meter prior to energization:
 - 1. Phase to ground
 - 2. Phase to phase
 - 3. Phase to neutral
 - 4. Neutral to ground
- B. Perform test in accordance with manufacturer's recommendation and to meet manufacturer's published minimum insulation values.
- C. Correct all defects revealed by such tests including replacing material with new as required.

END OF SECTION

SECTION 26 05 20

CABLE CONNECTIONS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1- General Requirements and related documents.
- B. All sections of this Specification.

1.02 DESCRIPTION

- A. Work Included: Provide wire connections and devices to be readily identifiable, mechanically and electrically secure wiring system.
- B. Related work specified in other sections:
 - 1. 26 05 19 Low Voltage Electrical Power Conductors and Cables

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 SUBMITTALS

- A. Samples: Provide samples upon specific request.
- B. Product Data: If materials are by manufacturers other than those specified, submit product data giving complete description for sizes employed, material types, and electrical ratings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Connections shall be made in atmospheres that are free from dirt, moisture, and elements which may be damaging.

1.06 MANUFACTURERS

- A. The materials shall be the product of a manufacturer with a minimum ten years experience in the manufacture of similar materials.
- B. Acceptable manufacturers are listed with the products.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Spring Connectors: Ideal "Wingnut" 3M-Scotch, Buchanan, and Thomas and Betts.
- B. Terminal Connectors: O-Z/Gedney, Burndy, and Thomas and Betts.\
- C. Splice Connectors: O-Z/Gedney or Burndy with insulating cover.
- D. "T" and Parallel Connectors: O-Z/Gedney or Burndy with insulating cover.
- E. Vinyl Plastic Tape: 3M-Scotch #33 or #88, Plymouth and Okonite.

- F. Rubber Tape: Okonite, 3M-Scotch and Plymouth.
- G. Colored Tape: 3M-Scotch, Plymouth.
- H. Wire Ties: Thomas and Betts "Ty-Rap", Ideal and Panduit.
- I. Tie Mounts, Plates, Anchors: Thomas and Betts, Ideal, and Panduit.
- J. Wire Tags: Self-laminating, cloth, wrap-on type by Thomas and Betts, Ideal, and Brady.
- K. Terminal Strips: Nylon; 600 volt; modular plug-on construction; tubular compression slip-in terminals properly sized; complete with mounting track, end clips, and anchors by Allen-Bradley, Square D, and Buchanan.
- L. Cable and Cord Fittings: Crouse-Hinds with wire mesh grip or Appleton.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine wires to be joined, tapped, spliced, terminated, and their connecting devices for defects which may affect the mechanical and electrical integrity of the connection.
- B. Do not proceed until defects are corrected.

3.02 PREPARATION

- A. Remove proper amount of insulation necessary for connection, clean conductors.

3.03 INSTALLATION

- A. No. 10 Wire and Smaller: Connect with spring connectors, terminate at terminal strips.
- B. No. 8 Wire and Larger: Connect and terminate with above specified tape half-lapped to produce a dielectric value equal to wire insulation.
- C. Train, hold, clamp, and tag wiring in cabinets, pull boxes, panels, and junction boxes with above specified devices.
- D. Splices in feeders and mains may only be made where designated on the drawings and where prior approval is obtained from the Architect.
- E. Install terminal strips in enclosures without means for termination of wiring.
- F. Install cable and cord grips on all cables and cords, entering enclosures. Use wire mesh grips where necessary for strain relief.

3.04 FIELD QUALITY CONTROL

- A. Test: Connections shall be resistance tested with megohm meter as specified for wire.

3.05 ADJUSTMENTS

- A. Assure that wire connections made by others in equipment furnished by others are mechanically and electrically sound prior to energization.

END OF SECTION

SECTION 26 05 23

CONTROL - VOLTAGE ELECTRICAL POWER CABLES

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide power wiring, raceways, and connections for items of equipment and control systems.
- B. All wiring for every system shall be installed in metal conduit. Refer to Section 26 05 32 Raceways for conduit types and materials for specific locations and applications.
- C. Related work specified in other sections:
 - 1. 23 09 00 Instrumentation and Controls for HVAC
 - 2. 26 00 01 General Provisions
 - 3. 26 05 19 Low Voltage Electrical Power Conductors and Cables
 - 4. 26 05 32 Raceways
 - 5. 26 28 16 Enclosed Switches and Circuit Breakers

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 WARRANTY

- A. The material shall be warranted to be free from defect and in proper working order for one year following the date of final acceptance.

1.05 COORDINATION

- A. For equipment furnished under other Divisions, obtain equipment supply and wiring requirements from the Contractor supplying the equipment.
- B. For equipment furnished under Division 23, obtain complete temperature control system drawings, and power supply and interlock wiring requirements from the Contractor furnishing the systems.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to related work specified in other sections for material requirements.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Work Included: The Electrical Contractor shall provide:
1. Branch circuit and motor feeder circuit conductors, raceway, connections, and overcurrent protection for each motor or item of equipment furnished by the Owner or other Contractors.
 2. Installation of motor controllers furnished by the Owner or other Contractors, along with branch circuit and motor feeder circuit conductors, raceway, and connections in accordance with the manufacturer's approved wiring diagrams.
 3. Disconnect switches and combination disconnect switches and motor controllers, where indicated on the drawings or required by codes, except as provided as an integral part of manufactured equipment.
 4. Power supply conductors, raceway, connections, and overcurrent protection for input power to HVAC Temperature Controls, HVAC Automation, and HVAC Energy Management Systems in accordance with approved rough-in and connection diagrams furnished by the system suppliers.
 5. The above represents an outline of the work for the purpose of describing one division of the work which is acceptable to insure that all work is contained within the General Contract. Nothing herein shall be construed to confine the General Contractor from assigning the work to any member or group of contractors deemed best suited to executing the work to effect the contract. Refer to specific bidding instructions of the General Contractor for the actual division of the work. The General Contractor is fully responsible for the installation of complete, operating systems in accordance with the functional intent of the specifications.
- B. Work Not Included: The Mechanical Contractor shall provide:
1. Motors and equipment, erected in place and ready for final connection of power supply wiring, along with manufacturer's approved wiring diagrams.
 2. Motor controllers, in suitable enclosures and of the type and size in accordance with the manufacturer's recommendations and NEMA requirements, along with properly sized overload elements and approved wiring diagrams.
 3. Disconnecting switches or devices which are normally provided as a part of manufactured equipment.
 4. Rough-in and connection diagrams for input power supply and connections for the HVAC Temperature Control, HVAC Automation, and HVAC Energy Management Systems.
 5. Conductors, raceways, devices, and connections for low voltage control, line voltage control, and signaling systems for the HVAC Temperature Control, HVAC Automation, and HVAC Energy Management Systems in accordance with the provisions of Division 26, and approved systems shop drawings to provide complete operating systems in accordance with the functional requirements of the specifications.
 6. The above represents an outline of the work for the purpose of describing one division of the work which is acceptable to insure that all work is contained within the General Contract. Nothing herein shall be construed to confine the General Contractor from assigning the work to any member or group of contractors deemed best suited to executing the work to effect the contract. Refer the specific bidding instructions of the General Contractor for the actual division of work. The General Contractor is fully responsible for the installation of complete, operating systems in accordance with the functional intent of the specifications.

- C. Completely connect all electrical consuming items of mechanical equipment, kitchen equipment, shop equipment, etc., provided by the Owner or other trades. Outlets of various types have been indicated at equipment locations, but no indications or exact location or scope of work is indicated on the accompanying drawings.
- D. Refer to details and information furnished by the Owner and various equipment suppliers for equipment wiring requirements and to the Plumbing and Heating, Ventilating and Air Conditioning Specifications for the scope of the connections to equipment provided under those sections, and determine from the various trades by actual measurements at the site, and by direction from the Owner and the Architect the exact locations of all items. Roughing-in drawings, wiring diagrams, etc., required for the proper installation of the electrical work will be furnished by applicable trades furnishing equipment. Request the drawings and information required in writing to the equipment supplier in ample time to permit preparation
- E. of the drawings and to permit proper installation of all wiring. Obtain from those furnishing equipment the size and type of service required for each motor or piece of electrical equipment and verify that the service to be installed is compatible.

3.02 INSTALLATION

- A. All conduits shall terminate in conduit boxes on motors where possible. When motors are direct-connected, the conduit may continue rigid into the box, but when motors drive through belts and have sliding bases, a piece of flexible liquid tight conduit not less than 12 inches long shall be connected between the rigid conduit and the motor terminal. Where motors are not provided with conduit boxes, terminate the conduit in a conduit at the motor.
- B. Where disconnecting switches are not provided integral with the control equipment for motors, provide and install a disconnect switch in the circuit to each motor where indicated and required by code. Switches shall be installed as close as possible to the motor or controls they serve and they shall be within sight of the motor or control circuit.
- C. Be responsible for installing all conductors and protective devices serving equipment motors furnished by others in strict conformance with all applicable codes, regardless of any discrepancy in plans and/or mechanical equipment sizes variations, unless covered by directives issued by the Architect.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Provide supplementary grounding electrodes as specified herein.
 - 1. Provide connections from the grounding electrode system to:
 - 2. The electric power system grounded circuit conductor (neutral).
 - 3. The electric power system non-current carrying enclosures and equipment ground conductors (equipment ground).
- B. Provide connections from the grounding electrode system to auxiliary ground conductors for data and voice communication systems (isolated ground).

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 REFERENCED STANDARDS

- A. National Electrical Code, NFPA 70.
- B. EIA/TIA Standard 607
- C. IEEE - Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

1.05 SUBMITTALS

- A. Where products are of a manufacturer other than listed as acceptable manufacturers, submit manufacturer's product literature completely describing conductors and cable assemblies and evidence of U.L. Listing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver conductors and cable assemblies to the project in the manufacturer's standard reels or boxes marked with conductor material, insulation type, conductor size and U.L. Label.
- B. Store conductors and cable assemblies in a clean, dry location to prevent damage from moisture, dust, personnel and equipment.
- C. Handle conductors and cables in a manner to prevent damage to conductor, insulation, jackets, and identifying markings.

1.07 MANUFACTURERS

- A. The materials shall be the products of a manufacturer with a minimum of ten years experience in the manufacture of similar material.
- B. Acceptable manufacturers shall be as listed with the material descriptions.

1.08 WARRANTY

- A. The material shall be warranted to be free from defect and in proper working order for a period of one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 CONDUCTORS

- A. Conductors buried in contact with the earth shall be bare copper, solid for sizes up to No. 6 AWG, concentric lay strand for sizes No. 8 AWG and larger.
- B. All other grounding conductors shall be copper conductor, Type THWN 600 volt 90 Deg.C. thermoplastic insulation, green color where available.

2.02 CONNECTIONS

- A. All connections made below grade, in inaccessible locations, and all connections and splices in the grounding electrode conductor system shall be made by exothermic weld process equal to Cadweld. Provide polyethylene inspection well covers and lids equal to Erico #T416B.
- B. All other connections shall be hydraulically crimped irreversible connectors equal to Thomas and Betts 54000 Series.
- C. Connections to building structural steel shall be exothermic weld equal to Cadweld.
- D. Connections which require flexibility for movement, expansion, or vibration shall be made with flexible flat conductor, multiple strands of 30 gauge copper conductors or equivalent circular mil area to the primary ground conductor. Protect ends with copper bolt hole end pieces.

2.03 CONDUITS

- A. Provide malleable iron conduit grounding bushings where:
 - 1. Metallic raceways terminate at metal housings without mechanical and electrical connection to housing.
 - 2. At each end of metallic conductors for grounding conductors where conduits are electrically non-continuous.

PART 3 EXECUTION

3.01 GROUNDED CIRCUIT CONDUCTOR

- A. Bond the grounding electrode system to the grounded circuit conductor (neutral conductor) at one location only, on the supply side of the service disconnecting means, with a neutral disconnecting link as required by the NEC.

3.02 EQUIPMENT GROUNDING CONDUCTORS

- A. Bond the non-current carrying parts of the electric power system to the grounding electrode conductor at the service disconnecting means. From this point forward, all non-current carrying parts of the electric power system shall be electrically connected and continuous by means of:
 - 1. Electrically continuous equipment enclosures, metallic boxes and metallic raceways connected with U.L. Listed connectors and couplings.
 - 2. Equipment grounding conductors supplementary to metallic raceway systems where shown on the Drawings.
 - 3. Equipment grounding conductors in non-metallic raceway systems and in flexible metal conduit systems.
 - 4. Where permitted under other sections of the Specification, the insulated grounding conductor provided in Type MC cable will be considered an acceptable equipment grounding conductor.
 - 5. Uninsulated grounding strips and spiral wrap provided in Type AC cable is not an acceptable grounding conductor.

3.03 SEPARATELY DERIVED SYSTEMS

- A. Separately derived systems include:
 - 1. Secondaries of dry type power transformer.
 - 2. Outputs of uninterruptible power systems.
 - 3. Outputs of motor generator sets or frequency convertors.
- B. These systems shall be grounded in accordance with the NEC, similar to the service disconnecting means discussed above, and as shown on the Drawings.
- C. The grounding electrode conductor from a separately derived system shall be connected to the main ground electrode bus described above, or to one of the secondary ground electrode busses, if present.

3.04 TESTING

- A. Grounding Continuity:
 - 1. Provide continuity tests and checks of equipment grounding and isolated grounding conductor systems to insure electrical continuity.
 - 2. Provide written certification of continuity checks upon requests.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1- General Requirements and related documents.
- B. All sections of this Specification.

1.02 DESCRIPTION

- A. Work Included: Provide miscellaneous materials for the supporting of electrical material and equipment.
- B. Related work specified in other sections:
 - 1. 26 00 01 General Provisions
 - 2. 26 05 32 Raceways
 - 3. 26 05 33 Boxes for Electrical Systems

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 SUBMITTALS

- A. Product Data: If materials are by manufacturers other than specified, submit product data giving complete description.

1.05 MANUFACTURERS

- A. Listed with Materials.
- B. Acceptable Manufacturers
 - 1. Kindorf
 - 2. Unistrut
 - 3. Caddy

PART 2 PRODUCTS

2.01 MATERIALS

- A. Continuous Slotted Channel: #12 gauge steel, electrogalvanized, with zinc chromate, bases and dimensions as required for application.
- B. Hanger Rods: Continuous thread, electrogalvanized, with zinc chromate, sizes as required for loads imposed.
- C. Hex Head Cap Screws and Nuts: No. H-113 and No. H-114, respectively.
- D. One-Hole Pipe Straps: Series HS-100, galvanized steel.

- E. Single Bolt Channel Pipe Straps: Steel, with machine screws and nut, Series C-105 and Series C-106.
- F. Lay-In Pipe Hanger: Series C-149.
- G. Conduit and Pipe Hanger: Series 6H.
- H. Beam Clamps: Series 500, RC, EC, and PC for applications.
- I. Concrete Inserts, Spot: Series D-256 or No. D-255.
- J. Concrete Inserts, Channel: Series D-980 or Series D-986.
- K. Riser Clamps: Series C-210.
- L. Cable Supports: O-Z/Gedney Type S.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Carefully lay out and provide concrete inserts.
- B. Securely fasten and support conduits and raceways to the building structure.
- C. Suspend horizontal runs of conduit and raceways from the floor and roof construction by rod hangers spaced 10 feet or less on centers for sizes 2-1/2 inches and greater and 9 feet or less on centers for sizes 2 inch and smaller.
- D. Fasten single runs of conduit to the structure with one-hole pipe straps and beam clamps or hang on rod hangers.
- E. Support multiple runs of conduit and raceways from continuous channel inserts or from trapeze hangers constructed of rod hangers and channels.
- F. Fasten single conduits to rod hangers with adjustable lay-in pipe hangers or for 2 inches and smaller conduits with Series 6H pipe hangers.
- G. Fasten conduits to channels with pipe channel straps.
- H. Support conduits and raceways within 3 feet of each end of each bend, of each termination, and at other intervals to maintain horizontal and vertical alignment without sag and deformation.
- I. Do not use cable, strap, and wire hangers as fasteners.
- J. Provide riser clamps for conduits at floor lines. Provide wire and cable supports in pull boxes for risers in accordance with NEC Section 300-19 and Table 300-19 (a).
- K. Install supports to permit equally distributed expansion and contraction of conduits and raceways with expansion joints. Use guides or saddles and U-bolts and anchors designed for equal effectiveness for both longitudinal and transverse thrusts.
- L. Do not support conduits and raceways for equipment connections.
- M. Provide special supports with vibration dampers to minimize transmission of vibrations and noises.
- N. Provide trapeze hangers for conduits and raceways where routing interferes with ducts
- O. Provide hangers, racks, cable cleats and supports for wires and cables in cable chambers and other locations to make a neat and substantial installation.

- P. Provide angle iron and channel supports to the floor and structure for panelboards, cabinets, pull and junction boxes. Support independently from entering conduits and raceways. Provide supports as specified for conduits and raceways for outlet boxes and pull boxes 100 cubic inches and smaller.
- Q. Provide supports sized for the ultimate loads to be imposed.

3.02 CLEANING

- A. Clean surfaces to be painted.

END OF SECTION

SECTION 26 05 32

RACEWAYS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide a mechanically and electrically complete conduit system.
- B. Related work specified in other sections:
 - 1. 26 00 01 General Provisions
 - 2. 26 05 19 Low Voltage Electrical Power Conductors and Cables
 - 3. 26 05 29 Hangers and Supports for Electrical Systems
 - 4. 26 05 23 Control Voltage Electrical Power Cables

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 SUBMITTALS

- A. Samples: Provide samples upon specific request.
- B. Product Data: If materials are by manufacturers other than those specified, submit product data giving complete description for sizes employed, material types, and installation methods.
- C. Certificates:
 - 1. Labels of Underwriters' Laboratories, Inc. affixed to each item of material.
 - 2. If materials are by manufacturers other than those specified submit certification that material meets applicable Underwriters' Laboratories, Inc. Standards.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect conduits and finishes from damage.

1.06 MANUFACTURER

- A. The materials shall be the products of a manufacturer with a minimum of ten years experience in the manufacture of similar equipment.
- B. Acceptable Manufacturers
 - 1. Metallic Conduits: Allied, and Wheatland.
 - 2. PVC Coated Metallic Conduits: Plastibond, Permacote, and Korkap.
 - 3. Others: As listed with products.

1.07 WARRANTY

- A. The materials shall be warranted to be in proper working condition for a period of one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Rigid Metal Electrical Conduit: Hot-dipped galvanized steel with zinc coated threads and an outer coating of zinc bichromate, complete with one coupling and one end thread protector. Intermediate metal conduit (IMC) is not allowed.
- B. Electrical Metallic Tubing: Welded, electro-galvanized thin wall steel tubing.
 - 1. Conduit for power wiring shall be natural electro galvanized.
 - 2. Conduit for other systems shall be color coded in accordance with Section 26 05 23 - Control Voltage Electrical Power Cables.
- C. Flexible Metal Electrical Conduit: Hot-dipped galvanized steel strip core with integral copper ground wire on sizes 1-1/4" and smaller.
- D. Liquidtight Flexible Metal Electrical Conduit: Hot-dipped galvanized steel strip core with extruded polyvinyl jacket.
- E. Rigid Nonmetallic Electrical Conduit: Schedule 40 heavy wall polyvinylchloride, high impact resistant.
- F. Elbows and Bends:
 - 1. All Types: Size 1-1/4 inch and larger shall be factory manufactured.
- G. Bushings:
 - 1. 1-1/4" and Smaller: Same material as the conduit with which they are installed.
 - 2. 1-1/2" and Larger: Hot-dipped galvanized with thermosetting phenolic insulation, 150 Deg.C.
- H. Locknuts:
 - 1. 1-1/2" and Smaller: Zinc plated heavy stuck steel, O-Z/Gedney.
 - 2. 2" and Larger: Cadmium plated malleable iron, O-Z/Gedney.
- I. Hubs: Cadmium plated malleable iron, tapered threads, neoprene "O" ring, insulated throat, O-Z/Gedney.
- J. E.M.T. Compression Connectors: Gland compression type, zinc plated steel body, cadmium plated, malleable iron nut, insulated throat, O-Z/Gedney.
- K. E.M.T. Compression Couplings: Gland compression type, zinc plated steel body, cadmium plated malleable iron nut, O-Z/Gedney.
- L. Liquidtight Conduit Connectors: Cadmium plated malleable iron body and nut, cadmium plated steel ferrule, insulated throat, integrally cast external ground lug, O-Z/Gedney.
- M. Seals for Watertight Wall and Floor Penetrations: Malleable iron body, oversize sleeve, sealing ring, pressure clamp and rings and sealing grommet, hex head cap screws, O-Z/Gedney.
- N. Seals for Penetrations through Existing Walls: Thunderline Corporation Link-Seal watertight sleeves, complete with wall and casing seals.

- O. Fire Seals: Galvanized iron pipe sleeves sealed with approved foam type fireproofing.
- P. Expansion Fittings: Hot-dipped galvanized malleable iron with bonding jumpers selected for linear or linear with deflection, as required.
- Q. Escutcheons: Chrome plated sectional floor and ceiling plates, Crane No. 10.
- R. Accessories: Reducers, bushings, washers, etc., shall be cadmium plated malleable iron on the forms and dimensions best suited for the application.
- S. Sleeves: 22 gauge galvanized steel sleeves where conduits pass through walls and floors. Standard galvanized steel pipe where conduits pass through beams, outside walls, or structural members.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine surfaces to which conduits are to be secured for:
 - 1. Defects which will adversely affect the execution and quality of work.
 - 2. Deviations from allowable tolerances for the building material.
- B. Do not start work until defects and deviations are corrected.

3.02 INSTALLATION

- A. Size conduits as indicated on the drawings and as required by the NEC for the number and sizes of wires to be drawn into conduit. Do not use conduit sized less than 3/4" unless specified otherwise.
- B. Conceal conduits from view in all areas except mechanical and electrical equipment rooms and crawl spaces. Should it appear necessary to expose any conduit:
 - 1. Bring to the attention of the Architect, immediately, and
 - 2. Rearrange the work to facilitate an approved installation.
- C. Install all conduits at elevations and locations to avoid interference with grading of other work, the structure, finished ceilings, walls. Avoid causing cutting of masonry units.
- D. To prevent displacement, securely support and hold in place all conduits installed in advance of other work and to be concealed in the building structure.
- E. Carefully lay out conduits run within the structure, such as floors, beams, walls, to avoid densities excessive for the construction. Relocate those conduits when excessive densities occur.
- F. Ream, remove burrs, and swab inside conduits before conductors are pulled in.
- G. Cap or plug conduits with standard manufactured accessories as soon as the conduits have been permanently installed in place.
- H. Bends and offsets in 1" and smaller conduits may be done with approved bending devices. Do not install conduits which have had their walls crushed and deformed and their surface finish damaged due to bending.
- I. Where space conditions prohibit the use of standard ells, elbows, and conduits, use cast ferrous alloy fittings of such forms and dimensions as best required for the application.
- J. Make all conduit joints mechanically tight, electrically continuous, and watertight. Pitch conduits in a manner to avoid creating moisture traps.

- K. Install insulated throat threaded hubs on conduits entering enclosures without threaded hubs where exposed to damp or wet locations.
- L. Connect and couple E.M.T. with compression type fittings. Do not use indentor and set screw fittings.
- M. Install and neatly rack exposed conduits parallel with and perpendicular to the building walls. Do not install exposed diagonal conduit runs.
- N. Route and suspend conduits crossing expansion joints to permit expansion, contraction, and deflection utilizing approved fittings to prevent damage to the building, conduits, and supporting devices in accordance with the National Electrical Code.
- O. Do not run conduits exposed on the roof unless approval is obtained prior to installation.
- P. Do not place conduits in close proximity to equipment, systems, and service lines, such as hot water supply and return lines, which could be detrimental to the conduit and its contents. Maintain a minimum 3" separation, except in crossing, which shall be a minimum 1".
- Q. Connect motors, equipment containing motors, equipment mounted on an isolated foundation, and other equipment and devices which are subject to vibration and which require adjustment with flexible metallic conduit from the device to the conduit serving it. Size the flexible conduit length more than 12 diameters, but less than 18 diameters. Rigidly support the points of attachment on each side of the connection.
- R. Install escutcheons on all exposed conduits passing through interior floors, walls, or ceilings. Install fire sealing materials on all conduits passing through fire rated partitions. Install wall and floor fire seals on all conduits passing through exterior walls and floors.
- S. Conduit sleeves shall be sized to permit insertion of conduit with adequate clearance for movement due to expansion and contraction. Where conduits pass through outside walls, watertight fittings, as specified herein, shall be used.
- T. Provide pullstring in each empty conduit. Label pullstring when conduit termination is not obvious.

3.03 USES PERMITTED

- A. Rigid Metal Conduit:
 - 1. Exterior conditions above grade.
 - 2. Interior wet or damp locations.
 - 3. Hazardous locations.
- B. Schedule 40 PVC without concrete encasement:
 - 1. Below grade interior to the building.
 - a. Electric services below floor slab.
 - b. Communications services below floor slab.
 - 2. Below grade exterior to the building.
 - a. Sizes 1-1/2" and smaller.
- C. Electrical Metallic Tubing:
 - 1. All uses above grade interior to the building, except as limited elsewhere in this section.
- D. Steel Armor Clad Cable:
 - 1. Concealed in walls and above ceilings.

2. Final connection from junction boxes on structure to individual light fixtures. Fixture-to-fixture wiring not permitted.
 3. Home runs from first junction box to panelboards shall be EMT.
- E. Flexible Metal Conduit:
1. Final connection to vibrating or adjustable equipment.
 2. Connection to vibrating equipment shall contain one 90 degree bend.
- F. Liquid tight Flexible Metal Conduit:
1. All uses permitted for flexible metal conduit.
 - a. In damp or wet locations.
 - b. Exterior to the building.

END OF SECTION

SECTION 26 05 33

BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all of the Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide outlet boxes for the installation of wiring devices, lighting fixtures, and power and control connections.
- B. Related work specified in other section:
 - 1. General Provisions: Section 26 00 01
 - 2. Wiring Devices: Section 26 27 26
 - 3. Lighting: Section 26 51 00
 - 4. Control Voltage Electrical Power Cables: Section 26 05 23

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 SUBMITTALS

- A. Samples: Provide samples upon specific request.
- B. Product Data: If materials are by manufacturers other than those specified, submit product data giving complete description for sizes employed, material types, and electrical ratings.

1.05 MANUFACTURERS

- A. Listed with Materials.
 - 1. Appleton Electric Company
 - 2. Raco
 - 3. Steel City
 - 4. Crouse Hinds
 - 5. Hubbell
 - 6. Raceway Components
 - 7. Walker

PART 2 PRODUCTS

2.01 MATERIALS

- A. Flush Mounted Outlet Boxes: Standard, stamped galvanized steel with factory conduit knockouts, one piece and welded construction:

1. Series 4S and 4S0 square boxes with covers.
 2. Series M1, M2, M3 - 250 and Series M1, M2, M3 - 350 masonry boxes with covers.
 3. Series 2G and GC-5075 switch boxes with covers.
 4. Series OCR concrete rings with Series OCP and OCP-3/8 back plates.
 5. Series 40 and 40D octagonal boxes with raised covers.
 6. Series SX expandable bar hangers.
- B. Surface Mounted Outlet Boxes: Cast metal with threaded hubs. Type FS and FD of form suited to the application.
- C. Fire Rated, Flush, Poke-Thru Outlets: Raceway Components, Inc. #RC-700A.
- D. Fire Rated, Flush, Poke-Thru Outlets with Conduit Adapter: Raceway Components, Inc. #RC-700-6-A.
- E. Floor Outlet Boxes: Hubbell cast flush floor boxes, fully adjustable with flush service fitting, and carpet flange (if required).

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine building structure to which outlet boxes are to be secured for defects which affect the execution and quality of work.
- B. Do not start work until defects are corrected.

3.02 PREPARATION

- A. Carefully measure and lay out exact locations in conference with the Construction Manager.
- B. Owner may change outlet box locations a distance of 5 feet before rough-in without additional cost.

3.03 INSTALLATION

- A. In dry walls for single and two gang outlet provide 4S and 4D boxes; for 3 or more outlets use masonry boxes.
- B. In poured concrete floors, provide cast flush floor boxes complete with service fittings and carpet flanges (if required).
- C. In existing concrete floors, provide fire-rated poke-thru outlets complete with wiring devices and other accessories (if required).
- D. In block and masonry walls provide masonry boxes of depths required for wall thickness.
- E. In poured concrete and plastered walls provide 4S and 4D boxes for single gauge outlets and 2G and 3G-5075 boxes for multiple ganged outlets.
- F. In concrete ceiling provide OCR rings.
- G. In other ceilings provide 40 and 40D boxes. Omit covers if standard canopy and device plates entirely cover the ceiling opening.
- H. In exposed work, exterior of the building, in wet locations, and flush in non-waterproofed walls below grade provide FS and FD boxes.
- I. Submit for approval special boxes for special devices and applications. Size according to device and application in accordance with NEC.

- J. Install outlet boxes finished to within 1/8 inch of finished surfaces.
- K. Install center of box at heights above finished floor:
 - 1. Wall Switches: 45 Inches
 - 2. Convenience Outlets: 18 Inches
 - 3. Telephone/Data Outlets: 18 Inches
 - 4. Wall Telephone Outlets: 45 Inches
 - 5. Boxes Indicated Above Counters: 4 Inches above backsplash and trim, unless otherwise indicated.
- L. Install wall switch outlet boxes on the strike side of doors as finally hung.
- M. Group outlet on circuits with homeruns as indicated on the Drawings.
- N. Do not provide through-the-wall and back-to-back boxes unless specifically noted on the drawings.
- O. Provide standard manufactured plugs in unused openings of boxes.
- P. Provide boxes at the terminal of conduit runs to outlets and devices.
- Q. Provide plaster rings and covers where required by the building structure.
- R. In brick finished walls, locate to work brick in a brick course where possible, and to permit conduits and raceways to enter from the rear without cutting brick, where possible.
- S. Provide 3/8 inch studs and lighting fixture outlet boxes where shop drawings of fixtures require and elsewhere as may be required for fixtures.
- T. Rigidly attach to structure and ceiling supporting members in suspended ceilings to avoid cutting mechanical ceiling members.
- U. Center outlet in paneling and in other Architectural features.
- V. Locate light fixture outlets in uniform relation with ceiling tiles.
- W. Label all junction boxes with circuit information as to its use for special system equipment. Use an indelible marker to mark information on cover.

3.04 CLEANING

- A. Clean surfaces to be painted.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Provide lighting and appliance branch circuit panelboards, circuit breakers and accessories.
- B. Related work specified in other sections:
 - 1. 26 00 01 General Provisions

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 REFERENCED STANDARDS

- A. NEMA PB 1 - Panelboards
- B. NEMA PB1.1 - Instructions for Safe Installation, Operation and maintenance of Panelboards Rated 600 Volts or Less.
- C. NEMA AB 1 - Molded Case Circuit Breakers
- D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
- E. UL 50 - Enclosures for Electrical Equipment
- F. UL 67 - Panelboards
- G. UL 98 - Enclosed and Dead-front Switches
- H. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures
- I. Federal Specification W-P-115C - Type Class 1
- J. Federal Specification W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit and Service.

1.05 SUBMITTALS

- A. Submit Shop Drawings including:
 - 1. Voltage Ratings.
 - 2. Main lug or breaker rating and location voltage ratings.
 - 3. Main Bus Rating.

4. Neutral Bus Rating and location.
5. Ground Bus Rating and location.
6. Thru-feed or sub-feed lug ratings and location.
7. Overall Panelboard Dimensions.
8. Interior Mounting Dimensions.
9. 1/4" scale layout of proposed equipment location including required working clearances, interference with other equipment and available recessing depth where applicable.
10. Location and arrangement of branch breakers.
11. Number of poles, trip ratings, and interrupting ratings of branch breakers.
12. Top and bottom conduit entries and knockouts.
13. Enclosure NEMA Type.
14. Panel deadfront, trim, door, hinge and locking provisions.
15. Manufacturer's literature describing circuit breakers and trip units for each type and frame employed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Equipment shall be included and off loaded in accordance with the manufacturer's published instructions.
- B. Upon arrival, inspect equipment for damage incurred in shipping.
- C. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.
- D. Conform to NEMA PB2 service conditions during and after installation of panelboards.

1.07 MANUFACTURER

- A. The equipment shall be the product of a manufacturer with a minimum of ten years experience with the manufacturer of similar equipment.
- B. Acceptable Manufacturers:
 1. Square D Company.
 2. General Electric.
 3. Eaton.

1.08 WARRANTY

- A. The equipment shall be warranted to be in proper working prder for a period of one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 GENERAL

- A. Interior:
 1. Shall be equal to Square D NQOB for 208 volt. Continuous main current ratings, as indicated on drawings.
 2. Minimum Short Circuit Rating:
 - a. 25,000 rms symmetrical amperes at 208Y/120 or as indicated on the Drawings.
 - b. All panelboard components shall be fully rated for the required short circuit interrupting rating. Series rating of devices is not permitted.

3. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors limited to bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current rating shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing shall be plated aluminum. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
4. All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
5. A solidly bonded aluminum equipment ground bar shall be provided. An additional aluminum isolated/insulated ground bar shall also be provided as indicated on the Drawings.
6. Interior trim shall be dead-front construction to shield user from energized parts. Dead-front trim shall have filler plated covering unused mounting space.
7. Nameplate shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, CSA/UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
8. Interiors shall be field convertible for top or bottom incoming feed. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.
9. Interior phase bus shall be pre-drilled to accommodate field installable options (i.e., Sub-Feed Lugs, Sub-Feed Breakers, and Thru-Feed Lugs).
10. Interiors shall accept 125 ampere breakers in group mounted branch construction.

B. Main Circuit Breaker

1. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40 Deg.C. ambient environment. Thermal elements shall be ambient compensating above 40 Deg.C.
2. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located in the front of the breaker that allows the user to simultaneously select the desired trip level all poles.
3. Circuit breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breaker shall be CSA and UL Listed for reverse connection without restrictive line or load markings.
4. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
5. Lugs shall be UL Listed to accept solid or standard copper and aluminum conductors. Lugs shall be suitable for 75 Deg.C. eated wire.
6. The circuit breakers shall be UL Listed for use with the following accessories: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits.

C. Branch Circuit Breakers

1. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the drawings.
2. Molded case branch circuit breakers shall have bolt-on type bus connectors.

3. Circuit breakers shall have an overcurrent toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles
4. The exposed faceplates of all branch circuit breakers shall be flush with one another.
5. Lugs shall be UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 75 Deg.C. rated wire.
6. Breakers shall UL Listed for use with the following factory installed accessories: Shunt Trip, Auxiliary Switch, and Alarm Switch.
7. Breaker shall be UL Listed with the follow ratings: (15-125A) Heating, Air Conditioning, and Refrigeration (HACR), (15-30A) High Intensity Discharge (HID), (15-20A) Switch Duty (SWD), (15-50A) Equipment Protection Device (EPD) (480Y/277Vac maximum).

D. Enclosures

1. Type 1 Boxes

- a. Boxes shall be hot zinc dipped galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvanized steel not acceptable.
- b. Boxes shall have removable endwall with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
- c. Box width shall not exceed 20" wide.

2. Type 1 Fronts

- a. Front shall meet strength and rigidity requirements per UL 50 Standards. Shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
- b. Mounting shall be flush or surface as indicated on the Drawings.
- c. Front shall have flat latch type lock with catch and spring loaded stainless steel door pull. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory card holder shall be mounted on the inside of door.
- d. Fronts shall be hinged door-in-door construction with front trim connected to enclosure with continuous piano hinge and latch to access all wiring and termination without removing the door from the enclosure. A separate door, hinge and latch shall be provided to access the deadfront compartment to provide access to main and branch breaker operating handles with no exposure to energized parts.

3. Type 3R, 5 and 12

- a. Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
- b. All doors shall be gasketed and equipped with a tumbler type vault lock and two (2) additional quarter turn fasteners on enclosures 59 inches or more in height. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory card holder shall be mounted on the inside of door.
- c. Maximum enclosure dimensions shall not exceed 21" wide and 9.5" deep.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with manufacturer's written instructions, NEMA PB 1.1 and NEC standards.
- B. Provide panelboard supports to the building structure independent of raceways.

3.02 FIELD QUALITY CONTROL

- A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads within 20% of each other. Maintain proper phasing for multi-wire branch circuits.
- C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.03 IDENTIFICATION

- A. Provide engraved panelboard nameplate permanently affixed to the panel door, giving panelboard name designation, system voltage, and name of the panelboard supply source.
- B. Provide a neatly typewritten circuit directory card in card holder inside panel door describing the name and location of devices served by each branch breaker using numbers finally established at the project.

3.04 FUTURE PROVISIONS

- A. From each flush mounted panelboard section, provide a minimum of two 1" conduits stubbed into the accessible ceiling and/or crawl space, as may be available, for future branch circuit wiring.
- B. Provide a pull cord in all future conduits with identifying tags on both ends.

3.05 COORDINATION OF LOADS SERVED

- A. Confirm that all branch circuit breakers are of the proper type and configuration for the loads finally connected:
 - 1. HCAR Rated.
 - 2. HID Rated.
 - 3. GFCI Rated.
 - 4. AFCI Rated.
 - 5. Three pole common trip breakers for multi-wire branch circuits.
- B. Reconnect loads, rearrange branch circuit breakers or provide new breakers as required to insure branch circuit breakers are proper type and properly rated for the loads finally connected.

3.06 CLEANING

- A. Throughout the construction period, maintain panelboards and interiors free of dust, debris, wire trimmings, etc. Provide heavy duty plastic barriers as required.

- B. Before final acceptance, thoroughly clean panelboards and interiors and vacuum clean to a dust free condition.

3.07 TRAINING

- A. Provide eight hours of training for the Owner's personnel in the operation and maintenance of the equipment.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide wiring devices and cover plates for outlets designated to receive them.
- B. Related work specified in other section:
 - 1. 26 00 01 General Provisions
 - 2. 26 05 33 Boxes for Electrical Systems

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 REFERENCED STANDARDS

- A. U.L. 20 - General Use Snap Switches.
- B. U.L. 498 - Attachment Plugs and Receptacles.
- C. NEMA WD-1 General Color Requirements for Wiring Devices.
- D. NEMA WD-6 Configurations for Specific Purpose Plugs and Receptacles.
- E. Federal Specification WS-896 Switches, Toggle, Flush mounted.
- F. Federal Specification WC-596 Connector, Electrical Power.

1.05 SUBMITTALS

- A. Samples: Provide samples upon specific request for typical NEMA devices.
- B. Product Data: If materials are by manufacturers other than those specified, submit manufacturer's product data describing materials and electrical ratings.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver devices and cover plates in manufacturer's sealed unopened packages and protect from the introduction of dust and moisture.
- B. Do not install wiring devices and cover plate until adjacent finishes are complete and the area has been cleaned to a dust free dry environment.

1.07 MANUFACTURER

- A. The equipment shall be the product of a manufacturer with at least ten years experience in the manufacture of similar equipment.
- B. All wiring devices on the project shall be of the same manufacturer where rated 50 amperes or less.
- C. Acceptable manufacturers:
 - 1. Leviton.
 - 2. Hubbell.
 - 3. Pass & Seymour.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless noted otherwise, wiring devices shall be standard industrial grade devices, gray color, with Type 302 stainless steel covers.
- B. Where specifically noted on the drawings or required by the Architect, wiring devices in finished areas shall be Decora commercial grade devices, white color, with commercial grade thermoplastic matching cover plate.
- C. Where required by the National Electrical code or local codes and ordinances, receptacles shall be commercial grade GFCI type, matching color with other wiring devices in the area, with matching polycarbonate cover plate.

2.02 INDUSTRIAL GRADE DEVICES

- A. Shall be equal to the devices listed below.
- B. Switches
 - 1. Single pole wall toggle, Leviton 1221-2. P&S PS20AC1.
 - 2. Three way wall toggle, Leviton 1223-2. P&S PS20AC3.
 - 3. Four way wall toggle, Leviton 1224-2. P&S PS20AC4.
- C. Straight Blade Receptacles
 - 1. 125V, 20A, 5-20R, Simplex, Leviton 5361, P&S 5361.
 - 2. 125V, 20A, 5-20R, Duplex, Leviton 5362, P&S 5362.
- D. GFCI Receptacles
 - 1. 125V, 20A, 5-20R, Duplex, Commercial Grade, Leviton 7599. P&S 1595.

2.03 DECORA DEVICES

- A. Shall be equal to the devices listed below.
- B. Switches
 - 1. Single pole wall toggle, Leviton 5621-2. P&S 2621.
 - 2. Three way wall toggle, Leviton 5623-2. P&S 2623.
 - 3. Four way wall toggle, Leviton 5624-2. P&S 2624.
- C. Straight Blade Receptacles
 - 1. 125V, 20A, 5-20R, Simplex, Leviton 16351. P&S 26361.
 - 2. 125V, 20A, 5-20R, Duplex, Leviton 16362. P&S 26352.

D. Isolated Ground

1. 125V, 20A, 5-20R, Duplex, Isolated Ground, Leviton 16362-IG. P&S 26262.

2.04 WEATHER RESISTANT DEVICES

- A. Where noted on the drawings or located exterior to the building, wall switches shall be provided with die cast zinc weatherproof, gasketed cover plate with NEMA 3R classification in wet locations.
- B. Where noted on the drawings or located exterior to the building, wall receptacles shall be provided with die cast zinc weatherproof gasketed cover plates with NEMA 3R classification, listed for in use unattended plugs in wet locations.

2.05 MOTOR RATED SWITCHES

- A. Fractional horsepower motors with internal overload protection shall be provided with double pole or three pole manual motor starting switches equal to Leviton MS series.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Align wiring device covers vertically and horizontally and assure flush fit to wall surface.
- B. Surface mounted devices in cast ferrous boxes shall be furnished with stamped steel galvanized face plates.

3.02 IDENTIFICATION

- A. Each receptacle shall be provided with a permanently affixed name plate giving the panelboard and branch circuit number supplying the outlet.
- B. Identification shall be on the inside or outside of the cover plate as directed by the Architect.
- C. Manual Motor Rated Switches shall be provided with permanently attached engraved phenolic name plates giving the panel and branch circuit source of supply and the name of the device controlled.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide disconnect switches and enclosed circuit breakers for branch circuit, motor circuits, and items of equipment.
- B. Related work specified in other sections:
 - 1. Division 23
 - 2. 26 00 01 General Provisions

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.04 REFERENCED STANDARDS

- A. UL 50 Cabinets and Boxes
- B. UL 98 Enclosed and Deadfront Switches
- C. UL 489 Molded Case Circuit Breakers
- D. UL 977 Fused Power Circuit Devices
- E. NEMA AB1 Molded Case Circuit Breakers and Molded Case Switches
- F. NEMA KS1 Enclosed Switches

1.05 SUBMITTALS

- A. Submit shop drawings including:
 - 1. Enclosure outline drawings and dimensions.
 - 2. Nameplate schedule.
 - 3. Assembly ratings including:
 - a. Main lug ratings and location.
 - b. Voltage ratings.
 - c. Short circuit ratings.
 - 4. Conduit entry and exit locations, dimensions, and knock-outs.
 - 5. Cable terminal sizes.
 - 6. Fuse types and ratings.
 - 7. Manufacturer's literature describing circuit breakers and trip units.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and off loaded in accordance with the manufacturer's published instructions.
- B. Upon arrival, inspect equipment for damage insured in shipping.
- C. Store and protect equipment from moisture and dust by storing in a clean, dry, heated space. Provide additional heavy plastic cover to protect the equipment and components. Provide auxiliary heating in the sections in accordance with the manufacturer's recommendations.

1.07 MANUFACTURER

- A. The equipment shall be the product of a manufacturer with a minimum of ten years experience with the manufacture of similar equipment.
- B. Acceptable Manufacturers:
 - 1. Square D Company.
 - 2. General Electric.
 - 3. Eaton.

1.08 WARRANTY

- A. The equipment shall be warranted to be in proper working order for a period of one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Enclosed Switches
 - 1. Provide enclosed switches where indicated on the drawings or required by NEC.
 - 2. Switches shall be NEMA Type HD, heavy duty, rated 240 volts, with quick-make, quick break switch units and external operator, rated 100,000 A.I.C.
 - 3. Switches shall be fused or unfused as shown on the drawings and as required by NEC, capacity and number of poles as indicate don the drawings.
 - 4. Enclosures shall be provided with interlocks to prevent opening the enclosure without first opening the switch and to prevent operating the switch with the enclosure open.
 - 5. Enclosures shall be provided with a means for pad locking in the open position.
 - 6. Enclosures shall be provided with an equipment grounding lug.
 - 7. Enclosures for use on four wire shall be provided with an insulated neutral bus.
 - 8. Line side and load side terminals shall be provided with insulating cover to prevent accidental contact.
 - 9. Indoor locations shall be provided with NEMA Type 1 Enclosures.
 - 10. Outdoor locations shall be provided with NEMA Type 3R Enclosures and water tight threaded hubs for conduit entry.
- B. Enclosed Circuit Breakers
 - 1. Provide enclosed circuit breakers or molded case switches where indicated on the drawings or required by the NEC.
 - 2. Circuit breaker for rating 250 amperes or less shall be thermal magnetic molded case circuit breakers.
 - 3. Molded case switches shall be non-automatic with no over current trip function.
 - 4. Units shall be 250 volt as required and unless noted otherwise shall be 42,000 A.I.C.

5. Enclosures shall be provided with a means for pad locking in the open position.
6. Enclosures shall be provided with and equipment ground bus.
7. Enclosures for use on four wire systems shall be provided with an insulated neutral bus.
8. Line side and load side terminals shall be provided with insulating covers to prevent accidental contact.
9. Indoor locations shall be NEMA Type 1 Enclosures.
10. Outdoor locations shall be NEMA Type 3R enclosures and watertight hubs for threaded conduit entry.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect building structure to which disconnects are to be secured for defects which affect the execution and quality of work.
- B. Do not start work until defects are corrected.

3.02 PREPARATION

- A. Carefully measure and lay out exact locations maintaining working clearances required by the National Electrical Code.

3.03 INSTALLATION

- A. Provide disconnects where indicated and where required by the National Electrical Code and all equipment where integral disconnects are not provided by the manufacturers.
- B. Provide disconnects mounted to building structure ahead of flexible conduit final connection to each fan powered terminal box.
- C. Install within sight of equipment served.
- D. Provide final connection to equipment served.
- E. Provide engraved lamicaid name plate secured to cabinet with designation of equipment served, operating voltage, and circuit designation.

END OF SECTION

SECTION 26 51 00

LIGHTING

PART 1 GENERAL

1.01 REFERENCED DOCUMENTS

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

1.02 DESCRIPTION

- A. Work Included: Provide lighting fixtures, lamps, and accessories for interior and exterior illumination of the building.

1.03 QUALITY ASSURANCE

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.
- C. Laboratory Testing: Photometric testing shall be by Independent Testing Laboratories, Inc., based on Illuminating Engineering Society published procedures, and shall include candlepower distribution tabulation and zonal cavity coefficient of utilization tabulation.

1.04 REFERENCE STANDARDS

- A. Underwriters' Laboratories No. 57 - Fixtures, Electric Lighting.
- B. Underwriters' Laboratories No. 1570 - Fixtures, Fluorescent Lighting.
- C. Underwriters' Laboratories No. 935 - Ballasts, Fluorescent Lamps.
- D. Underwriters' Laboratories No. 924 - Emergency Lighting and Power Equipment.
- E. Certified Ballasts Manufacturers Association - Lamps and Ballasts Combinations Safety and Performance Standards.

1.05 SUBMITTALS

- A. Submit manufacturer's literature giving materials, finishes, dimensions, coefficients of utilization, and lamp types for each fixture which is the product of one of the listed acceptable manufacturers.
- B. Submit large scale shop drawings and copies of independent testing laboratory test report, along with manufacturer's literature for each fixture which is the product of any manufacturer not listed as acceptable.
- C. Submit samples of fixtures upon specific request.
- D. Certificates: Labels of Underwriters' Laboratories, Inc.; Certified Ballasts Manufacturers, and Electrical Testing Laboratories affixed to each item of material.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be included and off loaded in accordance with the manufacturer's published instructions.

- B. Upon arrival, inspect equipment for damage incurred in shipping.
- C. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

1.07 MANUFACTURER

- A. The equipment shall be the product of a manufacturer with a minimum of ten years experience with the manufacturer of similar equipment.
- B. Listed in schedule and with materials.

1.08 WARRANTY

- A. The equipment shall be warranted to be in proper working order for a period of one year following the date of final acceptance.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lighting Fixtures:
 - 1. Fixtures shall be of the lighting fixture types scheduled on the drawings according to the letter type designations on the plans.
 - 2. If letter type designation is omitted from any fixture shown on the plans, provide the same fixture type as employed in rooms of similar usage.
 - 3. Where manufacturer's model numbers are used to describe fixtures, the intent is to establish the kind and quality of the fixture. The Contractor is responsible for examining the drawings to establish correct ordering information for each fixture including but not limited to number of ballasts to accommodate switching schedule, ballast voltage for the branch circuit supply, ceiling trim and mounting means for the ceiling material.
 - 4. Fixtures that utilize double ended lamps and contain ballasts that can be services in place shall have a disconnecting internal to each fixture.
- B. Lamps:
 - 1. Four Foot, T8, 32 watt fluorescent lamps:
 - a. Equal to Osram Sylvania F032/841/ECO Series
 - b. Initial Lumens: 2950
 - c. Mean Lumens: 2773
 - d. CRI: 85
 - e. Color Temperature: 4100K
 - f. Average Rated Life: 30,000 Hours
 - g. TCLP Compliant
- C. Ballasts
 - 1. For Four Foot, T8, 32 watt fluorescent lamps.
 - a. Equal to Osram/Sylvania QTP/32T8/UNIV/PSX Series
 - b. Programmed Rapid Start
 - c. Universal Input Voltage
 - d. Ballast Factor: 0.71
 - e. THD: <10%

- f. Power factor: >0.98
 - g. U.L. Listed Class P
 - h. 1, 2, 3, or 4 lamp as required by circuit switching
 - i. Parallel lamp wiring for operation with lamps missing or inoperative
 - j. Starting temperature: 0 Deg.F.
- D. Emergency Battery Ballast Units
- 1. Selected to operate the lamp and ballast combination for the specific light fixture for a minimum of 90 minutes at not less than 1100 initial lumens for one lamp.
 - 2. Include nickel-cadium battery, charger, and inverter for either switched fixture or unswitched fixture operation.
 - 3. Include status indicator light, to monitor charger, fault condition and battery and test switch.
 - 4. Include controls for automatic self-test for 30 seconds every 30 days and for 90 minutes once per year, with audible and visual signal to indicate test result.
 - 5. For switched fixture installations, provide unswitched branch circuit conductor to the fixture from the same branch circuit serving the area.
- E. Accessories: Manufacturers' standard mounting ring, trim flanges, hanger bars, spacers, supports, plaster frames of non-ferrous material or cadmium plated steel. Do not use painted steel plaster frames.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect Architectural drawings and specifications, including ceiling alternates, to determine ceiling material to be installed.
- B. Inspect Architectural reflected ceiling plans.
- C. Inspect installed ceiling components for defects affecting the quality and execution of work.

3.02 PREPARATION

- A. Verify ceiling material and alignment.
- B. Layout exact locations of fixtures in accordance with reflected ceiling plans, fixtures' and switches' outlet boxes and supports.
- C. Provide outlet boxes and conduit.
- D. Do not support light fixtures from the ceiling system if the weight of the fixture causes the total dead load to exceed the ceiling system design load or deflection specification. In such cases, light fixtures shall be supported by supplementary hangars located within 6 inches of each corner, or supported independently from the structure.
- E. Where existing fixtures are required to have ballasts replaced, fixtures that utilize double ended lamps shall be provided with a disconnecting means internal to each fixture.

3.03 INSTALLATION

- A. Provide lighting fixtures, lamps, switches, and control systems, and wiring.
- B. If designation omitted on drawings, provide same type fixtures employed in rooms of similar usage.
- C. Provide spacers for fixtures mounted on low density ceiling material.

- D. Provide plaster frames for recessed fixtures in plaster or gypboard ceilings.
- E. Install fixtures in and on acoustical tile ceilings in alignment with tile joints.
- F. Install fixtures in gypsum board ceilings to recess in the space available between structural members where the ceiling is installed tight against the structure.
- G. Note: Outlet boxes locations on drawings are diagrammatic only. Position outlet boxes to coincide with suspension hangers and knockouts.
- H. Install in accordance with manufacturer's instructions, submittal data, and details on the drawings.

3.04 ADJUSTMENT AND CLEANING

- A. Adjustment: Adjust lamp positions for desired effects. Align fixtures with building walls and tile joints.
- B. Cleaning: Remove dirt, grease, and foreign materials from fixtures. Remove fingerprints, smudges, and dirt from fixture's lenses and lamps.

3.05 LIGHTING FIXTURE SCHEDULE

- A. Reference drawings for Lighting Fixture Schedule.

END OF SECTION

Section 27 10 00 – Communications Cabling General Requirements

Part 1 - General

1.01 Scope

- A. Refer to Drawing T100 for additional project scope information.
- B. This section describes the products and execution requirements related to furnishing and installing Category 6 Cabling and Termination Components and related subsystems as part of a Structured Cabling System.
- C. Backbone system comprising copper and fiber optic cabling and horizontal (station) cabling is covered under this document.
- D. Others will provide the network electronics for the LAN within the Telecom Rooms (TRs) and will be responsible for connecting the new cabling infrastructure to the LAN. This Contractor, however, shall supply the Category 6 patch cords. The Contractor shall be available on site during the crossover to assist with any cabling issues that may occur during the connection.
- E. The Division 26 Electrical Contractor shall install conduits and surface raceway for new technology outlet locations unless otherwise noted. Division 27 Structured Cabling Contractor shall coordinate on site project walk thru(s) with Electrical Contractor to coordinate details of installation and pathway requirements.
- F. The Structured Cabling Contractor shall provide and install all sleeves through the wall penetrations as required whether or not specifically marked on Project Drawings, unless otherwise noted.
- G. All cables and related terminations support, and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following section(s).
- H. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the TX Electrical Code, and present manufacturing standards.
- I. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

1.02 Reference

- A. General: Definitions, reference standards and codes, qualifications, pre-construction submittals, construction progress submittals, closeout submittals, and correction period.

- B. Products: Substitutions, product specifications, miscellaneous material, cable, connectors, power devices, and interface panels.
- C. Execution: Coordination, testing, training, warranty, and cable management.

1.03 Reference Standards and Codes

- A. All references relate to the current version adopted by the city/county according to the authority having jurisdiction (AHJ). If the city/county has not adopted a version the latest version shall be utilized.
- B. ASTM B633: Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- C. ASTM A653: Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process
- D. ASTM A123: Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel
- E. ASTM A510: Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- F. ANSI/TIA 569-C: Telecommunications Pathways and Spaces
- G. ANSI/TIA 568-C.0, 1, 2, 3, 4: Commercial Building Telecommunications Standard
- H. ANSI/TIA-598-C-2005 – Optical Fiber Cable Color Coding
- I. ANSI/TIA 606-B: Administration Standard for Telecommunications Infrastructure
- J. ANSI/TIA 942-A: Telecommunications Infrastructure Standard for Data Centers
- K. ANSI/TIA 607-B: Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- L. IEEE: National Electrical Safety Code® (NESC®)
standards.ieee.org/about/nesc

1.04 Qualifications

- A. Premises Distribution System: Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568-C.0,1, 2, 3, EIA ANSI/TIA/EIA-569-B, and ANSI/TIA/EIA-606-A.
- B. Materials and Equipment: Where materials or equipment are specified to conform, be constructed, or be tested to meet specific requirements, certification that the items provided conforms to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.

C. Installers

1. All installing personnel shall have completed and be certified in manufacturer training or BICSI (Building Industry Consulting Service International) installation training for UTP infrastructure systems, or the Contractor shall contract with manufacturer for installation of all proposed components. Company Certifications shall accompany the proposal response.
2. The Contractor's technicians shall be certified and trained in the connectivity hardware that is being installed.
3. The Contractor shall submit certification that installers are factory certified to install and test the provided products. No less than half of the crew to be used for the telecommunications installation shall be trained by that manufacturer for the work.

1.05 Pre-Construction Submittals

A. Shop Drawings:

1. Product manuals and cut sheets with part numbers and quantities.
2. Outlet faceplate details for all outlet configurations, sizes, and cable types

1.06 Closeout Submittals

A. Provide three (3) sets of the following:

1. Data cable test results
2. USB drive containing:
 - a. As-built drawings (CAD format)
 - b. As-built drawings (PDF format)
 - c. Detailed test results in original tester format (Fluke Linkware)
 - d. Detailed cable test results in PDF format
 - e. Final rack elevation diagrams
 - f. Pictures of each TR including front and back of rack/cabinet elevations
3. Warranty certification from connectivity manufacturer

1.07 Delivery, Storage, and Handling

- A. Vendor shall be responsible for all materials until completion of Project.
- B. Cable shall be stored according to manufacturer's recommendations at minimum. In addition, cable shall be stored in a location protected from vandalism and weather.

- C. If cable is stored outside, it shall be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees Fahrenheit, the cable shall be moved to a heated (minimum 50 degrees Fahrenheit) location. If necessary, cable shall be stored off site at the Contractor's expense.
- D. If the Contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.
- E. Commercial off-the-shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

Part 2 - Products

2.01 Substitutions

- A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions.

2.02 Category 6 Horizontal Copper Cables

- A. All cables and equipment shall be furnished, tested, installed and wired by the Contractor.
- B. All horizontal data cables shall terminate on modular patch panels in the telecommunications closet as specified on the Drawings.
- C. This specification defines the requirements for commercially available high performance Category 6 cable.
- D. This cable shall be suitable for installation free-air, in building risers, in conduit, and/or in cable tray and shall carry CMP rating.
- E. The cable design described herein shall exceed transmission performance of Category 6 cables.
- F. The jacket color for data cables shall be BLUE.
- G. IMPORTANT: Cable and termination components (jack, patch panel, wiring blocks) are specified to function as a system. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the termination component manufacturer.
- H. Approved Manufacturers: Panduit TX6000 or General or Commscope equal.

2.03 Category 6 Patch Panels

- A. Cables shall be terminated at the telecommunication rooms on high-density modular integrated patch panels incorporating Category 6 jacks (non-keyed 8-pin), meeting the specifications for the telecommunications outlet detailed above.
- B. Patch panel configuration shall be 48 ports.
- C. The patch panel shall exceed ANSI/TIA/EIA 568-C.2-1 Category 6 component compliance standard.
- D. The patch panels shall be interoperable and backwards compatible to lower performing cabling systems.
- E. Panels shall incorporate cable support and/or strain relief support bar to secure the horizontal cables behind the patch panels.
- F. The patch panel shall have color-coded designation strips to identify cable count.
- G. Manufacturers:
 - 1. Panduit DP6 Plus
 - 2. Commscope Uniprise
 - 3. Ortronics Clarity

2.04 Horizontal Cable Management

- A. The cable managers shall be provided with movable wire retainers to retain the cables during cover removal and #12-24 mounting screws. An integral strain relief bracket shall be provided on either end of the duct to allow for easy cover placement.
- B. Double-Sided horizontal cable managers shall be placed above and below each patch panel.
- C. The Contractor shall supply (2) managers for patch panel and network electronics (electronics provided by others).
 - 1. Manufacturers: Chatsworth #55053-703

2.05 Information Outlet

- A. General
 - 1. Station cables shall each be terminated at their designated workstation location in the connector types described in the subsections below. Included are modular jacks, faceplates, and surface mount raceway. The combined assembly is referred to as the Standard Information Outlet (SIO). These connector assemblies shall snap into a mounting frame.

2. SIOs shall be mounted (1) where existing boxes are in place, (2) on surface mount raceway typically in surface raceway with barrier, (3) on floor mount interface boxes, or (4) on power poles either currently owned or new.
 3. The telecommunications outlet frame shall accommodate or incorporate the following:
 - a. A minimum of four (4) modular jacks, when installed on a wall-mounted assembly.
 - b. A mechanism for adjusting the surface plate to a plumb position.
 4. Multiple jacks are identified in close proximity on the Drawings. The Contractor shall determine the optimum compliant configuration based on the products proposed.
 5. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each SIO type for review by the Consultant.
- B. Modular Jack
1. Data jacks shall be non-keyed 8-pin modular jacks.
 2. Termination components shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
 3. Jacks shall utilize a four-layer printed circuit board to control NEXT.
 4. Jack housings shall fully encase and protect printed circuit boards and IDC fields.
 5. Modular jack contacts shall accept 2500 plug insertions.
 6. Modular jack contacts shall be formed flat for increased surface contact with mated plugs. These contacts shall be arranged on the PC board in two staggered arrays of four to maximize contact spacing and minimize crosstalk.
 7. Modular jack contacts shall be constructed of Beryllium copper for maximum spring force and resilience.
 8. Contact Plating shall be a minimum of 50 micro inches of gold in the contact area over 50 micro-inch of nickel, compliant with FCC part 68.5.
 9. Jack termination shall be 110 IDC, integral to the jack housing, laid out in two arrays of four contacts.
 10. Jacks shall utilize a paired punch down sequence. Cable pairs shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
 11. Jacks shall utilize tin lead plated (60% tin/40%lead) phosphor bronze 110 insulation displacement contacts.
 12. Jacks shall terminate 22-26 AWG stranded or solid conductors.

13. Jacks shall terminate insulated conductors with outside diameters up to .050”.
14. Jacks shall be compatible with single conductor 110 impact termination tools.
15. Jacks shall be compatible with EIA/TIA 606 color code labeling and accept snap on icons for identification or designation of applications.
16. Jacks shall be ORANGE in color.
17. Jacks shall be marked as either T568A or T568B wiring.
18. Category 6 jacks shall be manufactured by Panduit TX6, Ortronics Clarity or Commscope Uniprise.

C. Outlet Faceplates

1. Faceplates shall be plastic Ivory and incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.
2. Any unused jack positions shall be fitted with a removable blank inserted into the opening.
3. Modular jacks shall have capability to incorporate a dust cover that fits over and/or into the jack opening. The dust cover shall be designed to remain with the jack assembly when the jack is in use. No damage to the jack pinning shall result from insertion or removal of these covers. Dust covers that result in deformation of the jack pinning shall not be accepted.
4. All standard information outlets and the associated jacks shall be of the same manufacturer throughout each/the building. An allowable exception, however, is the wall-mounted “voice only” outlet described above.

D. Surface Mount Interface Box

1. Low profile, surface mount boxes shall incorporate recessed designation strips at the top for identifying labels. Designation strips shall be fitted with clear plastic covers.
2. The box shall feature built-in cable management for both fiber and copper applications.
3. The box shall have the capability to incorporate optional magnets that can be internally mounted.
4. Surface mount box shall be manufactured by modular jack manufacturer.

2.06 Cable Hook Systems

- A. In the areas where the cables are required to be run in a “free-air” plenum, a cable hook system shall be used.

- B. Spring steel cable hooks shall be capable of supporting a minimum of 100 lbs with a safety factor of 3 where extra strength is required.
- C. Follow manufacturer’s recommendations for allowable fill capacity for each size of cable hook.
- D. Installation and configuration shall conform to the requirements of the ANSI/EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code), and applicable local codes.
- E. Cable hooks shall:
 - 1. Have a flat bottom and provide a minimum of 1 5/8" cable bearing surface.
 - 2. Have 90-degree radiused edges to prevent damage while installing cables.
 - 3. Have a retainer that shall be removable and reusable.
- F. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653 G90. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.
- G. Cable hooks for corrosive areas shall be stainless steel, AISI type 304.
- H. Cable hooks shall be B-Line series BCH21, BCH32 or other manufacturer that meets these specifications.

2.07 Category 6 Patch Cords

- A. All Category 6 UTP patch cords shall be round and consist of eight insulated 23 AWG, stranded copper conductors, arranged in four color-coded twisted pairs within a flame retardant jacket and be backwards compatible with lower performing categories.
- B. Patch cords shall be wired straight through. Pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed.
- C. **The manufacturer of the cords shall be the same as the manufacturer for UTP termination hardware (jacks & patch panels). Cords shall be highest quality Category 6 cords available by connectivity manufacturer.**
- D. This Contractor shall provide the following patch cords (for pricing purposes only; see section 3.04 below):

<u>Qty</u>	<u>Length</u>	<u>Notes</u>
1	7 feet	1 Cord for every horizontal cable installed
1	10 feet	1 Cord for every horizontal cable installed
1 each	7 feet	Plenum – 1 for each Access Points
1 each	7 feet	Plenum – 1 for each IP Camera

Part 3 - Execution

3.01 Warranty

- A. The Contractor shall provide 1 year system assurance and product performance warranty.

3.02 Examination

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.
- B. Verify cable lengths comply with published standards.
- C. Notify Owner of installation that would exceed maximum lengths prior to installation of cable.
- D. Contactor shall consult with Owner regarding alternative routing or location of cable.
- E. Do not proceed until unsatisfactory conditions have been corrected.

3.03 Installation Requirements

- A. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment shall include, but not be limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices that may move or wear in a manner to pose a hazard to the cable shall not be used.
- B. Service Loops: A surplus of cable, typically located at or near the point of termination to facilitate potential future changes. Cables shall have a minimum cable slack of 10ft (3m) at the telecommunication room(s) and 3.28ft (1m) at each telecommunications outlet in the suspended ceiling unless noted otherwise. Service loops shall be stored in an extended loop or in a figure-eight configuration, not in bundled loops.
- C. Maximum pulling tension (TIA 568-C.5.3.1):
 - 1. The pulling tension for a 4-pair balanced twisted pair cable shall not exceed 110 N (25 lbf) during installation. For multipair cable (12-pair and above), manufacturer's pulling tension guidelines shall be followed.
 - 2. Sags between supports shall be a maximum of 300 mm (12 inches).

3.04 Station Cabling

- A. Information outlet cables with copper media shall be located as detailed on the Project Drawings.

- B. Station cables shall be run to the information outlet from the MER/TR serving each area in conduit, free-air above drop ceiling, in cable tray, and/or in modular furniture.
- C. The maximum station cable drop length for UTP cables shall not exceed 295 feet (90 meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and shall include any slack required for the installation and termination. The Contractor shall install station cabling in a fashion to avoid unnecessarily long runs.
- D. Contractor shall verify cable lengths comply with published standards; prior to installation of any horizontal cabling, this Contractor shall verify cable paths and confirm no horizontal cable will exceed 295 total feet. If it is determined that the cable will exceed 295', this Contractor shall route the cabling to another MER/TR or determine shorter path so cables are under 295'. If this is not possible, the Contractor shall notify the Consultant prior to installation. Failure to do this step will not result in a change order from the Contractor.
- E. All cables shall be installed splice-free unless otherwise specified.
- F. Avoid abrasion and other damage to cables during installation.
- G. Where installed free-air, installation shall consider the following:
 - 1. Cable shall run at right angles and be kept clear of other trades' work.
 - 2. Cables shall be supported according to code, using "J-hooks" anchored to ceiling concrete, walls, piping supports, or structural steel beams.
 - 3. Hooks shall be designed to maintain cable bend to larger than the minimum bend radius (typically 4 x cable diameter).
 - 4. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6 inches, another support shall be used.
- H. Cable shall never be laid directly on the ceiling grid.
- I. Cables shall not be attached to existing cabling, plumbing, or steam piping, ductwork, ceiling supports, or electrical or communications conduit.
- J. Cable sheaths shall be protected from damage from sharp edges. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
- K. All openings shall be sleeved and firestopped per prevailing code requirements upon completion of cable installation. Cable Support
- L. All cable support in the main cable path shall be installed every four feet. Small cable bundles (under 25) not in the main path may be supported every five feet.

M. Proper cable support is extremely important to the Owner, and care shall be taken by the Contractor to provide and install the appropriate supports. Supports found to be inadequate will be replaced.

N. Cable bundles including voice/data cabling shall not have plastic cable ties.

3.05 Cooperation

A. The Contractor shall cooperate with other trades and General Contractor's personnel in locating work in a proper manner.

B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.06 Testing and Acceptance

A. The Contractor shall perform acceptance tests as indicated below for each subsystem (backbone, station, etc.) as it is completed.

B. The Contractor shall supply all equipment and personnel necessary to conduct the acceptance tests. Prior to testing, the Contractor shall provide a summary of the proposed test plan for each cable type, including equipment to use, setup, test frequencies or wavelengths, results format, etc. The Consultant will approve the method of testing.

C. The Contractor shall visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. The Contractor shall provide the Consultant with a written certification that this inspection has been made.

D. The Contractor shall conduct acceptance testing according to a schedule coordinated with the Consultant. Representatives of the Owner may be in attendance to witness the test procedures. The Contractor shall provide a minimum of one (1) week advance notice to the Consultant and Owner to allow for such participation. The notification shall include a written description of the proposed conduct of the tests, including copies of blank test result sheets to be used.

E. Tests related to connected equipment of others shall be done only with the permission and presence of Contractor involved. The Contractor shall ascertain that testing only as required to prove the wiring connections are correct.

F. The Contractor shall provide test results and describe the conduct of the tests, including the date of the tests, the equipment used, and the procedures followed. At the request of the Consultant, the Contractor shall provide copies of the original test results.

- G. All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the Contractor's expense. The applicable tests shall then be repeated.
- H. Backbone voice cables shall be free of shorts within the pairs and be verified for continuity, pair validity and polarity, and conductor position on the termination blocks (e.g., 110). Any mispositioned pairs shall be identified and corrected. The percentage of "bad" pairs shall not exceed 1% in any backbone (riser or tie) cable based on total pair count. All bad pairs shall be identified and documented.
- I. The Consultant or Owner may request that a 10% random field re-test be conducted on the cable system to verify documented findings.
 - 1. If requested, the Contractor shall test up to 10% of cable links at no cost to the Owner.
 - 2. Tests shall be a repeat of those defined above and under Testing and Acceptance. If findings contradict the documentation submitted by the Contractor, additional testing shall be performed to the extent determined necessary by the Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.07 Fire Stopping

- A. Contractor shall seal any openings created for cable pass-through between floors or through fire rated walls. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
- B. Creation of such openings as are necessary for cable passage between locations as shown on the Drawings shall be the responsibility of the Contractor. Any openings created by or for the Contractor and left unused shall also be sealed as part of this work.

3.08 Labeling of Cabling and Termination Components

- A. Contractor shall confirm Owner's precise labeling scheme with Owner prior to labeling faceplates, cables and patch panels.
- B. Cabling
 - 1. Horizontal cables shall have a machine generated wrap around cable label within 4" of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standards. Character height shall be .25" (minimum).

3.09 Standard Information Outlet (SIO) Faceplates

- A. All faceplates shall be clearly labeled indicating the destination of the cable(s) (telecommunication room number), the data patch panel(s) letter designation, the data port number(s) on the data patch panel(s), and the voice cable number(s).
- B. Telecommunications outlets are to be labeled (1) on the cover of the assembly and (2) on each cable terminated at that location.
- C. Station cables shall be labeled within two inches of the cable end.

3.10 Data Patch Panels

- A. All data patch panels shall be clearly labeled indicating the telecommunication room number, the data patch panel letter designation, and the data port number on the data patch panel (ports 1 through 48). Each telecommunication room shall start with data patch panel 'A' and continue through the alphabet.

End of Section

