PROJECT MANUAL

FOR

HOPE AVENUE HOMES

South Bend, Indiana

BID PACKAGES 1 - 29

Prepared for:



Prepared by:

ALLIANCE

929 Lincolnway East, Suite 200 South Bend, IN 46601

> For Bids Due APRIL 30, 2021

SET NUMBER: _____

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00 11 16 - INVITATION TO BID

Notice is hereby given that South Bend Heritage will receive sealed bids for Bid Packages for the construction of a new two-story, 19,344 sq. ft. apartment building located at 2923/2929 Hope Avenue, South Bend, Indiana.

FOR THE PROJECT:	HOPE AVENUE HOMES South Bend, Indiana
	BID PACKAGES 1 – 29
BY THE OWNER:	SOUTH BEND HERITAGE (OWNER) 803 Lincoln Way West South Bend, IN 46616
BID OPENING:	2:00 p.m. EST on Friday, April 30, 2021
	Bids received after that time will be returned unopened.
	The sealed Bids will be privately opened.
DOCUMENT AVAILABILITY:	Friday, April 2, 2021
PRE-BID MEETING:	1:00 p.m. EST on Wednesday, April 14, 2021
	Meeting will be held at the Charles Martin Center 802 Lincolnway West South Bend, IN 46601
CONTRACT TIME:	Shall not exceed 270 calendar days from Owner Notice to Proceed

All work for the complete construction of the project will be under multiple prime contracts with the Construction Manager/General Contractor (CM/GC), based on bids received and on combinations awarded. The Construction Manager will manage the construction of the project.

The Owner reserves the right to accept or reject any bid (or combination of bids) and to waive any irregularities in bidding. No bidder may withdraw his bid for a period of sixty (60) calendar days after the date set for bid opening.

Construction shall be in full accordance with the Bidding and Contract Documents which are on file with the Owner and may also be examined by prospective bidders at the following locations:

OFFICES OF THE ARCHITECT:

ALLIANCE ARCHITECTS 929 Lincolnway East, Suite 200 South Bend, IN 46601 OFFICES OF THE CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC):

SOUTH BEND HERITAGE (OWNER) 803 Lincoln Way West South Bend, IN 46616

PLAN ROOMS: MACIAF 3215-A Sugar Maple Business Court South Bend, Indiana 46628

The Contract Documents are on file and available for public inspection during regular working hours at the offices of the CM/GC, South Bend Heritage, 803 Lincoln Way West, South Bend, IN 46616. Contact: Safa Saddawi Telephone (574) 274-5678 and MACIAF, 3215-A Sugar Maple Business Court, South Bend, IN 46628. Additionally, the Contract Documents will be available for inspection or purchase at ARC Document Solutions (ARC), located at 1303 Northside Blvd., South Bend, IN 46615, http://www.e-arc.com (574) 287-2944, toll free (800) 783-7231. There will be a non-refundable charge of the cost for reproduction as set by ARC for every set of documents for all bidders.

Bidders must direct all questions in writing during the bidding period to South Bend Heritage, Safa Saddawi; <u>SafaS@sbheritage.org</u>.

The successful bidders will submit their Federal Identification Number to the CM/GC, prior to signing the contract. In the absence of an F.I.N., they must submit their Social Security Number.

An out-of-state contractor will be obligated to show proof that they are registered with the Indiana Secretary of State to conduct business in the State of Indiana.

Prevailing Wage Rates will be applicable to this project. The CM/GC will provide a listing of all applicable wage rates to the bidders. The successful bidder is required to submit weekly certified payroll forms (Form WH-347) to the CM/GC within two weeks of the applicable payroll date.

The successful bidders shall be required to furnish Contract Performance and Payment Bonds for 110% of their contract amount <u>if</u> greater than \$250,000.00 prior to execution of contracts. Bonds shall be maintained in accordance with IC 36-1-12-13.1 and 36-1-12-14. Bonds shall be in full force and effect for a period of at least 12 months after the date of final completion of the Contract. Should the contractor's bonding company give notice of cancellation, the contractor will be responsible for securing new bonds within fourteen (14) calendar days.

END OF SECTION

1. IDENTIFICATION

As used in these specifications the words Owner, Architect, Construction Manager, Contractor, and Project shall mean the following:

PROJECT: HOPE AVENUE HOMES

BID PACKAGES 1 – 29

- OWNER: SOUTH BEND HERITAGE PSH LLC 803 Lincolnway West South Bend, Indiana 46616
- ARCHITECT: ALLIANCE ARCHITECTS 929 Lincolnway East, Suite 200 South Bend, IN 46601
- CONSTRUCTIONSOUTH BEND HERITAGEMANAGER/803 Lincolnway WestGENERALSouth Bend, IN 46616CONTRACTORCONTRACTOR

SUBCONTRACTOR: Awarded Contractor for each Bid Package Subdivision Contract (Prime Contractor) along with his sub-contractors and suppliers, within each building package.

2. DEFINITIONS AND COMMUNICATIONS

- a. All definitions set forth in the "Standard Form of Agreement Between Contractor and Subcontractor (AIA Document A401-2007), are applicable to these Instructions to Bidders.
- b. All communications for the administration of the contract shall be as set forth in the General Conditions, and in general, shall be through the Construction Manager/GC.
- 3. BIDDING DOCUMENTS
 - a. The bidding documents are the bidding and contract requirements, the specifications, the drawings, and any addenda issued prior to receipt of bids.
 - b. Documents are on file and may be examined or obtained for bidding purposes as stated in the Invitation to Bid.
- 4. ADDENDA DURING BIDDING
 - a. Any additional information required by the bidders, revisions in the work, changes or additions, discrepancies in the bidding documents, or clarifications, will be in the form of addenda written and issued by the Architect to the Construction Manager/GC. The Construction Manager/GC will then issue addenda to all prime contractors of record as of the date of such addenda.

- b. All addenda issued prior to the time and date set for termination of bidding shall become a part of the bidding documents and bidders shall list by number and date on the form of proposal, all addenda which have been received by him prior to submittal of his bid. The lump sum proposal amount shall include all work described by all such addenda. It shall be the bidder's responsibility to determine that he has received all addenda, since no extra costs will be allowed by failure of the bidder to do so.
- c. Any bidder in doubt as to the true meaning of any part of the bidding documents may submit, no later than ten (10) days prior to the date set for receipt of bids, a written request to the Construction Manager/GC. The Construction Manager will forward all requests requiring Architect's determination to the Architect for an interpretation thereof. All interpretations of the bidding documents will be made by an addendum.
 - 1) Bidders must direct all questions in writing during the bidding period to South Bend Heritage, Safa Saddawi; <u>SafaS@sbheritage.org</u>.
- d. No oral, telephonic, or telegraphic instructions or information shall be binding on the Owner, Architect, Construction Manager/GC, or bidder unless confirmed by an addendum.
- 5. SUBSTITUTIONS AND APPROVALS DURING BIDDING
 - a. See Sections 01 25 13 SUBSTITUTION PROCEDURES and Section 00 80 00 SUPPLEMENTARY CONDITIONS.
- 6. ALTERNATES AND UNIT PRICES
 - a. Each bidder, in addition to the submission of his lump sum base bid, shall submit bids for any alternate bid and unit price called for; failure to submit said bids and unit prices shall be sufficient cause for the owner to reject the bid in its entirety. Also, the Owner may, at his discretion, consider any required alternate bid in the awarding of a contract.
 - b. The Owner retains the right to include or exclude work required by alternates, for the sums established up to the time where the Contractor feels what work associated with the alternate cannot be implemented at the quoted price. The Contractor must notify the Construction Manager/GC in writing of this condition no less than fourteen (14) days prior to the noted time.
 - c. The Owner retains the right to include or exclude work covered by unit prices, for the sums established exercisable for the life of the contract.
 - d. All bidders shall indicate for each alternate the appropriate add or deduct, no change (N/C) or not applicable (N/A). No indication will be considered as a no change.

7. BIDDER'S REPRESENTATION

a. The bidder has carefully examined the documents and informed himself of the limitations and conditions related to the Work covered by his bid and shall include in his bid a sum to cover the cost of such items. The Bidder shall report to the Construction Manager and Architect any errors, inconsistencies, or ambiguities discovered.

- b. Each bidder by making his bid represents that he has visited the site and familiarized himself with the local conditions under which the work is to be performed.
 - 1) No additional costs of any type will be allowed for the failure of the bidder to avail himself of the privilege of a complete and thorough, onsite inspection.
- c. In addition to the specific references made in these bidding requirements and instructions, the bidders shall be bound by the provisions of the executed contracts, the Conditions of the Contract, the drawings, the specifications, and all addenda issued prior to and all modifications made after, execution of the Contract. Subcontractors shall be bound by all of the obligations of the Contractors. Wherever in the Specifications the Contractor is obligated to the owner, the subcontractor/supplier shall be and become obligated to the contractor and the owner in a like manner.
- 8. BID SECURITY NOT APPLICABLE
- 9. CONTRACTOR'S QUALIFICATION STATEMENT
 - a. Bidders to whom an award of Contract is under consideration shall submit to the Construction Manager/GC, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.
- 10. PREPARATION OF BIDS
 - a. Bids shall be submitted in duplicate only on the Bid Form found in Section <u>00 41</u> <u>00 BID FORM.</u>
 - b. Any bidder, at his/her option may submit a combined bid made from any combination of individual bid package subdivisions. A separate bid must be submitted for <u>each bid package subdivision</u> in addition to the combined bid. Combined bids will <u>not be considered</u> unless the bidder also submits separate bids on each bid package subdivision contained in the combined bid. Voluntary alternates will be considered provided the bidder first submits a bid based on specified work. The Bid Package Subdivision numbers which are in the Combined Bid should be clearly listed on the Bid Form and on the outside of the Bid Envelope.
 - c. Prices for Alternates (if any) will be submitted on the Bid Form found in Section <u>00</u> <u>41 00 BID FORM.</u>
 - d. Bids shall be completely and correctly filled out using ink or typewriter, with signatures in ink.
 - e. Prices shall be stated both in figures and in writing and in the event of a discrepancy between the writing and the figures, the written amount shall govern.
 - f. Bids shall be signed personally by the Bidder, by a partner or by duly authorized officer for a corporation and shall give the bidder's business address and telephone number.
 - g. Any interlineation, alteration, or erasure will be grounds for rejection of the bid. Bids shall contain no recapitulation of the work to be done.

- h. Bids shall be based on the materials, construction, equipment, and methods named or described in the specifications and on the drawings, and any addenda issued prior to receipt of bids.
- i. The low bidders, within forty-eight (48) hours after bid opening, if requested by the Architect or Construction Manager, shall submit to the Construction Manager a complete list of subcontractors, suppliers, and manufacturers furnishings and/or installing materials and products (including those who are to furnish materials or equipment fabricated to a special design) specified on this project. The list shall be complete with names, addresses, city, state, zip code, telephone and FAX numbers, and contract values.
- 11. BID SUBMITTAL
 - a. Proposals shall be sealed in an opaque envelope marked with the bidder's name and business address, and bearing the following caption:

Proposal for: Bid package Subdivision # 1 Bid package Name: Earthwork

Proposal for: Bid package Subdivision # 2 Bid package Name: Building Concrete

Proposal for: Bid package Subdivision # 3 Bid package Name: Asphalt Paving

Proposal for: Bid package Subdivision # 4 Bid package Name: Site Concrete

Proposal for: Bid package Subdivision # 5 Bid package Name: Gypsum Concrete

Proposal for: Bid package Subdivision # 6 Bid package Name: Masonry Proposal for: Bid package Subdivision # 7 Bid package Name: Metals

Proposal for: Bid package Subdivision # 8 Bid package Name: General Trades I – Framing, Rough Carpentry and

Wood Trusses

Proposal for: Bid package Subdivision # 9 Bid package Name: General Trades II – Finish Carpentry and Architectural Woodwork

Proposal for: Bid package Subdivision # 10 Bid package Name: Insulation Proposal for: Bid package Subdivision # 11 Bid package Name: Roofing

Proposal for: Bid package Subdivision # 12 Bid package Name: Vinyl and Polymer Siding/ Preformed Fiber Cement Cladding (Alternate #2)

Proposal for: Bid package Subdivision # 13 Bid package Name: Aluminum Doors and Storefront

Proposal for: Bid package Subdivision # 14 Bid package Name: Windows

Proposal for: Bid package Subdivision # 15 Bid package Name: Doors and Hardware

Proposal for: Bid package Subdivision # 16 Bid package Name: Gypsum Drywall

Proposal for: Bid package Subdivision # 17 Bid package Name: Resilient Flooring

Proposal for: Bid package Subdivision # 18 Bid package Name: Carpet

Proposal for: Bid package Subdivision # 19 Bid package Name: Painting

Proposal for: Bid package Subdivision # 20 Bid package Name: Specialties

Proposal for: Bid package Subdivision # 21 Bid package Name: Residential Appliances

Proposal for: Bid package Subdivision # 22 Bid package Name: Casework

Proposal for: Bid package Subdivision # 23 Bid package Name: Fire Sprinkler System

Proposal for: Bid package Subdivision # 24 Bid package Name: Mechanical Proposal for: Bid package Subdivision # 25 Bid package Name: Electrical

Proposal for: Bid package Subdivision # 26 Bid package Name: Special Systems (Fire, Security, Phone, Cable TV)

Proposal for: Bid package Subdivision # 27 Bid package Name: Site Improvements

Proposal for: Bid package Subdivision # 28 Bid package Name: Landscaping

Proposal for: Bid package Subdivision # 29 Bid package Name: Irrigation

b. Proposals shall be addressed to and delivered to on the day of the bid opening:

Mr. Safa Saddawi, Sr. Project Manager South Bend Heritage 803 Lincoln Way West South Bend, IN 46616

12. MODIFICATION OF BIDS

a. Modification of bids already submitted will be accepted by letter or telegram if received by the Owner prior to the date and hour set for receipt of bids.

13. WITHDRAWL OF BIDS

- a. Bids may be withdrawn at any time prior to the scheduled time for receipt of bids.
 - 1) Withdrawn bids may not be resubmitted.
 - 2) Bids shall not be withdrawn for a period of sixty (60) days after bid opening without consent of the Owner.

14. TAX EXEMPT, PERMITS/INSPECTIONS

- a. Materials and properties purchased under contract with the Owner that becomes a permanent part of the structure or facilities constructed **are not subject to the Indiana Gross Retail Tax (Sales Tax). The exemption number will be furnished to the Contractor upon award.**
- b. Contractors will be obligated to obtain all required permits and inspections necessary by State and Local governing agencies, for each respective Bid Package.
- 15. FORM OF AGREEMENT BETWEEN GENERAL CONTRACTOR AND SUBCONTRACTOR
 - a. The Agreement for the Work will be written on AIA Document A401-2007, Standard Form of Agreement Between Contractor and Subcontractor.

16. PREVAILING WAGES AND CERTIFIED PAYROLLS

a. Prevailing Wage Rates (see Section <u>00 43 43 PREVAILING WAGE</u> <u>REQUIREMENTS</u>) determined by the U.S. Department of Labor will be applicable to this Project. the Construction Manager/GC will provide a listing of all applicable wage rates to all bidders. The successful bidder is required to submit weekly certified payroll forms (Form WH-347) to the Construction Manager/GC within two weeks of the applicable payroll date.

17. NON-DISCRIMINATION

a. The Contractor hereby assures that it will comply with all Federal and Indiana Civil Rights laws including, but not limited to I.C. 22-9-1-10. The Contractor, by submitting a bid, certifies and agrees that if he is the successful bidder and is awarded and executes a contract, he and his Subcontractor or Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this contract, with respect to said employee's or applicant's hire, tenure, terms, conditions, or privileges of employment or any matter directly or indirectly related to employment because of said employee's or applicant's race, color, religion, sex, age, handicap, national origin or ancestry. Also, in this regard, and pursuant to I.C. 36-1-12-15(b), the contractor agrees that the provisions of I.C. 5-16-6-1 are hereby incorporated by reference into these Contract Documents as if they were fully set forth herein, and shall be binding upon the Contractor. Breach of this covenant may be regarded as a material breach of the Contract.

MINORITY AND WOMEN BUSINESS ENTERPRISE DIVERSITY DEVELOPMENT PROGRAM

South Bend Heritage is committed to Minority Business ("MBE") and Women's Business Enterprise ("WBE") participation in this Project.

The goal for MBE/WBE participation for the purchase of work, labor, services, supplies, equipment, materials, or any combination in this project is <u>7.1%</u> of the total bid amount, whether it be base bid or base bid plus alternate(s). Minority and Women's Businesses are described on the Indiana Department of Administration website: <u>http://www.in.gov/idoa/</u>. It is the bidder's sole responsibility to verify whether any listed minority or woman business meets the qualifications of a Minority or Women's owned business. Documentation shall be provided with the bid that states the MBE/WBE that will be contracted, the dollar amount of the work that will be performed on the project and the percentage of the dollar amount as it relates to the total bid amount by using Form MWBE-1.0, Proof of MBE/WBE Participation Goal Form.

In the event the bidder cannot meet the MBE/WBE participation goal set for this project, the award of the contract requires the Contractor's good faith efforts to obtain participation by those Contractors classified as a Minority Business ("MBE") or as a Women's Business Enterprise ("WBE").

Failure to either meet the MBE/WBE participation goal set forth in this project or provide ALL the required evidence of good faith efforts with the bid will be grounds for rejecting a bid as non-responsive.

The requirements that bidders shall supply as good faith efforts to have active participation from MBEs and/or WBEs on this Project is written documentation evidencing the efforts by using Form MWBE-2.0, Evidence of Good Faith Efforts and Form MWBE-2.1, MBE/WBE Contacted. Such documentation shall include but is not limited to the following items:

A listing of all MBE/WBEs contacted including: (1) the name and address of the MBE/WBE; (2) the date of contact; (3) the type of contact (i.e. phone call, written solicitation, etc.); (4) the nature or type services or goods requested; and (5) the result of the contact.

- b. Written evidence of outreach and copies of email exchanges inviting and receiving quotes or other responses from MBE/WBE businesses or other documentations of efforts to encourage and secure competitive quotes from MBE/WBE and local businesses to be included in the benefits of building this Project.
- c. Written documentation of letters of introduction, invitations to forging majority/minority strategic alliances for capacity building including but not limited to mentoring, extensions of assistance on payroll, insurance, bonding, line of credit, technical skills or business skills.

All bidders are actively encouraged to reach out to the MBE/WBE businesses in St. Joseph County, Indiana and other local Indiana counties to utilize a good faith effort to forge constructive and lasting business partnerships.

Notwithstanding the foregoing, the award and performance of all South Bend Heritage contracts shall comply with applicable federal, state, and local laws.

END OF SECTION

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Refer to Section <u>01 11 01 SUMMARY OF WORK</u> for Hope Avenue Homes, all in accordance with plans and specifications prepared by Alliance Architects.
- 2. SCOPE
 - a. The Project consists of the total construction and complete finishing of a twentytwo (22) unit, two-story, 19,344 square feet +/- permanent supportive housing project located at Hope Avenue, South Bend, Indiana, all to be as shown on the plans and/or herein specified. The requirements set forth in Division <u>1 GENERAL</u> <u>REQUIREMENTS</u> shall apply to all contractors and/or subcontractors.
 - b. Each contactor is responsible to familiarize themselves with the entire contents of the Construction Documents and their respective bid packages. Specifications and Drawings listed under each bid package are for reference and may not include every aspect of the bid package.

3. WORK COVERED BY CONTRACT DOCUMENTS

a. BID PACKAGE 1 – EARTHWORK

- 1) Installation, maintenance and removal of erosion control measures.
- 2) Installation, maintenance and removal of temporary construction fencing and gates.
- 3) Site preparation work.
- 4) Earthwork including all excavation, special excavations, backfill, compaction, rough grading and finish grading.
- 5) Placement and compaction of all engineered fill.
- 6) Placement, finish grade and compaction of all subbase materials for walks, exterior slabs and pavements.
- 7) Placement, finish grade and compaction of floor slab course.
- 8) Installation of water service and sanitary sewer from city mains to building area.
- 9) Installation of storm drainage system, structures and piping.
- 10) Excavation, backfill and subgrade compaction for building footprints.

b. BID PACKAGE 2 – BUILDING CONCRETE

- 1) Construction of concrete footings and foundation walls.
- 2) Application of damp-proofing and insulation.
- 3) Termite control for building foundation and under slab areas.
- 4) Construction of concrete building slab.

c. BID PACKAGE 3 – ASPHALT PAVING

- 1) Placement of all asphalt paving for parking and drives.
- 2) Painting of all pavement markings and stripes.
- 3) Provide and install handicap parking signs.

d. BID PACKAGE 4 – SITE CONCRETE

- 1) Construction of all concrete walks, curbs and exterior slabs
- 2) Construction of accessible curb ramps.

e. BID PACKAGE 5 – GYPSUM CONCRETE

1) Placement of all gypsum concrete floor underlayment on the Upper floor.

f. BID PACKAGE 6 – MASONRY

1) Provide and install adhered stone masonry and cast stone.

g. BID PACKAGE 7 – METALS

- 1) Provide all structural steel, miscellaneous metals, and stair railings.
- 2) Installation by others.

h. BID PACKAGE 8 – GENERAL TRADES 1: FRAMING/ ROUGH CARPENTRY

- 1) Construction of wood framed walls, floors, and roof trusses.
- 2) Construction of exterior walls and installation of rigid insulation.
- 3) Construction of wood framed stairs.
- 4) Installation of all structural steel.
- 5) Installation of steel stair railings.
- 6) Installation of all exterior wall windows.
- 7) Installation of temporary enclosures and protection.
- 8) Provide and install all firestopping and joint sealants.
- 9) Provide and install of all wood blocking.
- 10) Construction of all wood decking.

i. BID PACKAGE 9 – GENERAL TRADES II: FINISH CARPENTRY AND

ARCHITECTURAL WOODWORK

- 1) Provide all finish carpentry.
- 2) Installation of all doors/frames, access doors, door hardware.
- 3) Provide and install acoustical ceiling systems.
- 4) Installation of casework.
- 5) Installation of all toilet room, bathroom accessories.
- 6) Provide and install joint sealants.
- 7) Installation of Specialties

j. BID PACKAGE 10 – INSULATION

- 1) Provide and install all building loose insulation including perimeter walls, interior walls, ceilings, and attic.
- 2) Provide and install spray applied insulation.

k. BID PACKAGE 11 – ROOFING

- 1) Provide and install fiberglass-based asphalt shingle roof.
- 2) Provide and install roof flashing and pre-finished trim.
- 3) Provide and install all roof accessories.
- 4) Provide and install metal roof system.

I. BID PACKAGE 12 – VINYL AND POLYMER SIDING:

- 1) Provide and install vinyl and polymer siding, including, but not limited to wood trim and accessories (Alternate).
- 2) Provide and install all preformed fiber cement exterior cladding systems and trim.

m. BID PACKAGE 13 – ALUMINUM DOORS AND STOREFRONT

1) Provide and install all aluminum doors and storefront systems including all glass and glazing.

n. BID PACKAGE 14- WINDOWS

1) Provide all clad window units.

2) Installation by others.

o. BID PACKAGE 15 – DOORS AND HARDWARE

- 1) Provide all steel doors/frames.
- 2) Provide all wood doors/frames.
- 3) Provide all access panels.
- 4) Provide all door hardware.
- 5) Installation by others.

p. BID PACKAGE 16 – GYPSUM DRYWALL

1) Provide and install gypsum wallboard systems.

q. BID PACKAGE 17 – RESILIENT FLOORING

1) Provide and install all resilient flooring, wall base and trim accessories, (excludes carpeted areas).

r. BID PACKAGE 18 – CARPET

1) Provide and install all carpet systems including vinyl wall base and trim accessories.

s. BID PACKAGE 19 – PAINTING

1) Provide and install all paint systems.

t. BID PACKAGE 20 - SPECIALTIES

- 1) Provide corner guards.
- 2) Provide fire extinguishers and cabinets.
- 3) Provide postal specialties.
- 4) Installation by others (See Bid Package 9-General Trades II -Finish Carpentry)

u. BID PACKAGE 21 – RESIDENTIAL APPLIANCES

- 1) Provide all kitchen appliances for Community Room, Kitchen and Apartment Units.
- 2) Provide all Laundry Room washer appliances.
- 3) Installation by others.

v. BID PACKAGE 22 – CASEWORK

- 1) Provide all pre-manufactured casework.
- 2) Installation by others.

w. BID PACKAGE 23 – FIRE SPRINKLER SYSTEM

- 1) Provide and install complete automatic fire sprinkler system.
- 2) Provide and install firestopping.

x. BID PACKAGE 24 – MECHANICAL

- 1) Provide and install all plumbing systems from stub 5 feet outside of building including domestic water, fire service water, sanitary, sewer and gas.
- 2) Provide and install all heating, ventilating and air conditioning systems.
- 3) Provide and install firestopping.
- 4) Install residential appliances with water connections.

y. BID PACKAGE 25- ELECTRICAL

- 1) Provide and install all electrical systems for building and site.
- 2) Provide and install firestopping.

z. BID PACKAGE 26- SPECIAL SYSTEMS

1) Provide and install complete fire alarm and security systems.

aa. BID PACKAGE 27- SITE IMPROVEMENTS

- 1) Provide and install bike racks.
- 2) Construct trash enclosure screen walls, gates, and bollards.
- 3) Extension of storm drain piping from roof building roof drains to storm sewer system, including clean out.

bb. BID PACKAGE 28- LANDSCAPING

- 1) Provide and install plant materials.
- 2) Provide and install lawns, including all open lawns, no-mow lawns, and native habitat areas

cc. BID PACKAGE 29- IRRIGATION

- 1) Installation of irrigation system.
- 2) Installation of drip irrigation system.
- 3) All work for the complete construction of this project will be under multiple prime contracts with the South Bend Heritage Construction Manager/GC.
- 4. Each contractor is responsible for their own cutting and patching where necessary.

4. PRIME CONTRACTS

- b. The multiple prime contracts are defined by Bid Packages which designate one or more various disciplines of work. These Bid Packages are being packaged to maintain job scheduling. Due to this fast-track method, time is of the essence in performance of this work.
- c. A construction progress schedule, which defines milestone progress for this project, will be issued with each Contract. This schedule will be preliminary and is meant to define the project goals. A more detailed schedule will be developed after contracts are awarded.
- c. The Bid Package Subdivisions (BPS) being considered under this Bid Package are as follows:
 - a) <u>BPS</u> <u>Description</u>
 - 1 EATHWORK
 - 2 BUILDING CONCRETE
 - 3 ASPHALT PAVING
 - 4 SITE CONCRETE
 - 5 GYPSUM CONCRETE
 - 6 MASONRY
 - 7 METALS
 - 8 GENERAL TRADES I FRAMING/ROUGH CARPENTRY
 - 9 GENERAL TRADES II FINISH CARPENTRY AND

ARCHITECTURAL WOODWORK

- 10 INSULATION
- 11 ROOFING
- 12 VINYL AND POLYMER SIDING
- 13 ALUMINUM DOORS AND STOREFONTS
- 14 WINDOWS
- 15 DOORS AND HARDWARE

- 16 GYPSUM DRYWALL
- 17 RESILIENT FLOORING
- 18 CARPET
- 19 PAINTING
- 20 SPECIALTIES
- 21 RESIDENTIAL APPLIANCES
- 22 CASEWORK
- 23 FIRE SPRINKLER SYSTEM
- 24 MECHANICAL
- 25 ELECTRICAL
- 26 SPECIAL SYSTEMS
- 27 SITE IMPROVEMENTS
- 28 LANDSCAPING
- 29 IRRIGATION
- d. Future Bid Packages will be added under subsequent phases of construction documents, which will, in total, define the overall scope of this project.
- 5. OWNER REQUIREMENTS AND USE OF PREMISES
 - a. It is the intention of the Owner to award contracts to the successful Bid Package Sub-Division Contractors who submit the lowest and/or best bid. Any bidder, at his/her option may submit a combined bid made from any combination of individual bid package sub-divisions. A separate bid must be submitted for each bid package sub-division and applicable alternates in addition to the combined bid. Combined bids will not be considered unless the bidder also submits separate bids on each bid package sub-division and alternates contained in the combined bid. Voluntary alternates will be considered provided the bidder first submits a bid based on specified work.
 - b. Abusive language, music radios, actions or disrespectful behavior by any workers directed to Construction Manager/GC's employees, visitors, or others while working on the project grounds is subject to immediate removal and dismissal.
 - c. Designated smoking areas, parking areas, and construction trailer staging areas will be as directed by the Construction Manager/GC. No parking or loitering will be permitted on access roads or mobilization areas. Fire lanes shall be kept clear at all times to maintain access to the existing buildings and fire department connections.
 - e. No materials may be stored within the building. Contractors shall be responsible for scheduling on time delivery of their materials or provide their own storage trailers on site, located as directed by the Construction Manager/GC.
- 6. LICENSE REQUIREMENTS
 - a. All contractors shall be licensed as required by Local and State agencies. Contractors shall verify these requirements with the respective governing agencies.
- B. PRODUCTS (Not used)
- C. BID PACKAGE SUBDIVISION DESCRIPTION

- 1) All products listed will be furnished and installed unless otherwise noted. All Contractors shall be responsible for layout for their scope of work.
 - a. BPS Number BID PACKAGE SUB-DIVISION DESCRIPTION

1.	EARTHWORK
Specifications:	
Included:	General Requirements, Division 0 and 1
31 00 00	Earthwork
31 25 00	Erosion and Sediment Control
31 31 16	Termite Control

 $\frac{Drawings:}{C1.0 - C4.0} \\ S1.0 - S2.0 \\ A1.1 - A5.2 \\ \label{eq:started}$

2. BUILDING CONCRETE

Specifications:

- Included: General Requirements, Division 0 and 1
- 03 10 00 Concrete Formwork
- 03 20 00 Concrete Reinforcement
- 03 30 00 Cast-in Place Concrete
- 03 30 53 Cast-in Place Concrete Finishes

Drawings:

C1.0 - C4.0 S1.0 - S2.0 A1.1 - 5.2

3. ASPHALT PAVING

Specifications:

Included: General Requirements, Division 0 and 1

32 12 16 Hot Mixed Asphalt Paving

Drawings: C1.0 - C4.0

4. SITE PAVING

Specifications:

Included: General Requirements, Division 0 and 1

32 13 13 Concrete Paving

 $\frac{Drawings:}{C1.0-C4.0}$ A1.1 - A5.2

5. GYPSUM CONCRETE

General Requirements, Gypsum Concrete	Division 0 and 1
	General Requirements, Gypsum Concrete

6. MASONRY

<u>Specifications:</u> Included:	General Requirements, Division 0 and 1
04 42 13	Adhered Stone Masonry

04 42 13	Adhered Stone Maso
04 72 00	Cast Stone

Drawings: S1.1-S1.2 A1.1 - A4.4

A5.1 – A5.2

7. METALS

Specifications:

Included: General Requirements, Division 0 and 1

05 50 00	Metal Fabrications
05 52 00	Metal Handrails

Drawings:

S1.1 – S1.2 S2.1 – S2.1 A5.1 – A5.2

8. GENERAL TRADES I – FRAMING/ROUGH CARPENTRY

Specifications:

Included: General Requirements,	Division 0 and 1
---------------------------------	------------------

- 06 02 00 Temporary Enclosures
- 06 10 00 Rough Carpentry
- 06 17 53 Shop-Fabricated Wood Trusses
- 07 21 00 Thermal Building Insulation
- 07 84 00 Firestopping
- 07 92 00 Joint Sealants
- 08 54 13 Fiberglass Fixed Windows and Awning

<u>Drawings:</u> S1.0 - S1.1 S2.0 A1.1 - A6.4

9.

GENERAL TRADES II – FINISH CARPENTRY/ARCHITECTURAL WOODWORK

Specifications: Included: General Requirements, Division 0 and 1 06 20 00 Finish Carpentry 06 40 23 Architectural Woodwork 07 21 00 **Thermal Building Insulation** 07 92 00 Joint Sealants 08 11 13 Hollow Metal Doors and Frames Wood Doors 08 14 00 Access Doors and Panels 08 31 00 08 71 00 Door Hardware 10 44 16 Fire Extinguishers and Cabinets 10 55 00 **Postal Specialties** 12 24 00 Window Shades 12 35 30 **Residential Casework** Drawings: S1.0 - S2.0A1.1 - A9.2 10. INSULATION Specifications: Included: General Requirements, Division 0 and 1 07 21 00 Thermal Building Insulation 09 21 16 Gypsum Drywall Assemblies Drawings: A.1.1-A7.1 11. ROOFING Specifications: Included: General Requirements, Division 0 and 1 07 31 13 Fiberglass Based Asphalt Shingles and Accessories Flashing and Sheet Metal 07 60 00 07 63 00 Gutters and Downspouts Drawings: A2.1 - A5.2 12. PREFORMED FIBER CEMENT CLADDING

<u>Specifications:</u> Included: General Requirements, Division 0 and 1

07 46 40	Vinyl and Polymer Siding and Engineered Wood Trim
07 46 46	Fiber Cement Siding

Drawings:

A1.1 – Ā5.2

13. ALUMINUM DOORS AND STOREFRONT

Specifications:

Included: General Requirements, Division 0 and 1

08 13 16	Aluminum Doors
08 41 13	Aluminum Framed Entrances and Storefronts

Drawings:

A1.1 – A1.2 A3.1 – A3.2 A7.1

14. WINDOWS

Specifications:	
Included:	General Requirements, Division 0 and 1
08 52 13	Fiberglass Fixed and Awning Windows

<u>Drawings:</u> A1.1 – A1.2

A3.1 – A4.4 A7.2

15. DOORS AND HARDWARE

Specifications:Included:General Requirements, Division 0 and 108 11 13Hollow Metal Doors and Frames

8	11	13	Holic	ow ivi	etai	Doors	and	Frames	3
-					_				

- 08 13 16 Aluminum Doors
- 08 14 00Wood Doors08 71 00Door Hardware

Drawings:

A1.1 – A1.2 A6.1 – A6.4 A7.1

16. GYPSUM WALLBOARD SYSTEM

Specifications:

Included:	General Requirements, Division 0 and 1
09 21 16	Gypsum Drywall Assemblies

<u>Drawings:</u> A1.1 – A9.2

17. **RESILIENT FLOORING** Specifications: Included: General Requirements, Division 0 and 1 09 65 00 **Resilient Flooring** Drawings: A1.1 – A1.2 A6.1 - A6.4A8.1 18. CARPETING Specifications: Included: General Requirements, Division 0 and 1 09 68 00 Carpeting Drawings: A1.1 – A1.2 A6.1 - A6.4 A8.1 PAINTING 19. Specifications: Included: General Requirements, Division 0 and 1 Joint Sealants 07 92 00 09 91 00 Painting Drawings: A1.1 - A1.2 A6.1 – A6.4 A8.1 **SPECIALTIES** 20. Specifications: Included: General Requirements, Division 0 and 1

10 26 13Corner Guards10 44 16Fire Extinguishers10 55 00Postal Specialties

Drawings:

 $\begin{array}{l} A.1.1 - A1.2 \\ A6.1 - A6.4 \end{array}$

21. RESIDENTIAL APPLIANCES

Specifications: Included: General Requirements, Division 0 and 1 11 30 00 Residential Equipment

<u>Drawings:</u> A1.1 - A1.2 A6.1 - A6.5

22. CASEWORK

Specifications:			
Included:	General Requirements,	Division 0 and	1

12 35 30 Casework

<u>Drawings:</u> A1.1 – A1.2 A6.1 – A6.4

23. FIRE SPRINKLER SYSTEM

Specifications:

Included: General Requirements, Division 0 and 1

21 00 00	Fire Suppression
07 84 00	Firestopping

Drawings:

 $\begin{array}{l} C1.0-A4.0\\ P1.1-P2.1\\ E1.1-E3.0 \end{array}$

24.

Specifications: Included: General Requirements, Division 0 and 1

	— , , ,
07 84 00	Firestopping
11 30 00	Residential Equipment
Division 22	PLUMBING
Division 23	HCAV AIR DISTRIBUTION

MECHANICAL

Drawings:

C1.0 - C4.0 M1.1 - M1.2 P1.1 - P2.1 E1.1 - E3.0

25.

ELECTRICAL

Specifications:Included:General Requirements, Division 0 and 1

07 84 00	Firestopping
11 30 00	Residential Equipment
Division 26	ELECTRICAL
Division 27	COMMUNICATIONS
Division 28	ELECTRONIC SAFEY AND SECURITY

Drawings:	
C1.0 - C4.0	
E1.1 – E3.0	

26.	SPECIAL SYSTEMS
Specifications: Included:	General Requirements, Division 0 and 1
07 84 00	Firestopping
11 30 00	Residential Equipment
Division 27	COMMUNICATIONS
Division 28	ELECTRONIC SAFETY AND SECURITY

<u>Drawings:</u> E1.1 – E4.2

27.	SITE IMPROVEMENTS	
Specifications:	General Requirements	Division 0 and 1
included.	General nequirements,	Division o and 1
32 13 13	Concrete Paving	
33 41 00	Storm Utility Drainage	

Drawings:

C1.0 - C4.0

28.	LANDSCAPING	
Specifications: Included:	General Requirements,	Division 0 and 1
32 92 00	Lawns	

32 93 00 Plants

Drawings: C1.0 - C4.0L1.0

29. IRRIGATION

Specifications: Included: General Requirements, Division 0 and 1

32 84 00 Irrigation Systems

Drawings: L2.0

END OF SECTION

00 31 00 - INFORMATION AVAILABLE TO BIDDERS

A. MILESTONE SCHEDULE:

1. The milestone schedule will be provided as a probably and desirable sequence of construction activities and will be attached to the Contract upon award. The actual construction schedule may vary due to material and manpower availability. In no event will the milestone schedule be allowed to be used as a basis for additional compensation for actual construction activities earlier or later than indicated on the milestone schedule.

B. SOIL INVESTIGATION REPORT:

1. A soil investigation report has been prepared for the site of this Work by the soil investigation engineer WCG and is included in Section <u>02 30 00 SOILS INVESTIGATION</u> for reference.

END OF SECTION

00 41 00 - BID FORM

Bidder's Name:_____

Bidder's Address: _____

The undersigned certifies that the submitted bid is based upon a careful examination of the applicable construction documents, and existing site conditions and is total and complete for the named portions of the work and is in accordance with all Documents of Record to date of this Proposal.

BID PROPOSAL:

The following in a bonafide lump sum base bid proposal under for the work at: Hope Avenue Homes.

BID PACKAGE SUBDIVISION (BPS)	SUBDIVISION DESCRIPTION	LUMP SUM
1	EARTHWORK	\$
2	BUILDING CONCRETE	\$
3	ASPHALT PAVING	\$
4	SITE CONCRETE	\$
5	GYPSUM CONCRETE	\$
6	MASONRY	\$
7	METALS	\$
8	GENERAL TRADES I -FRAMING/ROUGH CARPENTRY	\$
9	GENERAL TRADES II -FINISH CARPENTRY/ARCHITECTURAL WOODWORK	\$
10	INSULATION	\$
11	ROOFING	\$
12	VINYL AND POLYMER SIDING	\$
13	ALUMINUM DOORS AND STOREFRONT	\$
14	WINDOWS	\$
15	DOORS AND HARDWARE	\$

16	GYPSUM DRYWALL	\$	
17	RESILIENT FLOORING	\$	
18	CARPETING	\$	
19	PAINTING	\$	
20	SPECIALTIES	\$	
21	RESIDENTIAL APPLIANCES	\$	
22	CASEWORK	\$	
23	FIRE SPRINKLER SYSTEM	\$	
24	MECHANICAL	\$	
25	ELECTRICAL	\$	
26	SPECIAL SYSTEMS	\$	
27	SITE IMPROVEMENTS	\$	
28	LANDSCAPING	\$	
29	IRRIGATION	\$	
<u>/ 11 </u>			(Dollars)
(written amount)			
ALTERNATES:			
Alternate No. 1 : Provide price to sub	stitute clapboard siding in place of adher	ed stone masonry	throughout.
		\$	

ADD/DEDUCT	4)

Alternate No. 2:

Provide price to substitute fiber-cement siding (clapboard, board and batten, shakes and trim) in place of vinyl siding and trim throughout.

ADD/DEDUCT	S	\$

Alternate No. 3:

Delete the entire irrigation system, outside the building as shown on Sheet <u>L2.0 IRRIGATION</u> <u>PLAN</u> and Specification Section <u>32 80 00 IRRIGATION</u> shall be an Alternate. Refer to <u>UTILITY</u> <u>PLAN SHEET C1.1; DETAIL-1</u>

ADD/DEDUCT _	9	\$
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Alternate No. 4:

Construct new 5' wide concrete sidewalk along Hope Avenue. Set edge of walk 6" south of property line. Sidewalk shall be constructed in accordance with the City of South Bend standard specifications.

ADD/DEDUCT	· \$
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VOLUNTARY ALTERNATES:

Bidders choice, selection, or option

Fully describe all proposed substitutions, changes or alternates of each type and description, stating appropriate ADD or DEDUCT amounts where applicable. Sufficient technical materials must accompany voluntary alternates in order for Architect to review and judge the merits of the proposed voluntary alternates.

(None below shall be included in Base Bid).

(Attach additional information to this form if needed). **BID QUALIFICATIONS:**

"**DO NOT** USE THIS SECTION FOR THE SUBMISSION OF VOLUNTARY ALTERNATES OR MATERIAL SUBSTITUTIONS. USE FOR EITHER OF THE ABOVE WILL RESULT IN DISQUALIFICATION OF BID AT OWNER'S DISCRETION."

The items listed in this bid form are subject to the following qualifications (bidder to clarify or qualify any point in question on the plans or specifications). Failure to do so binds the Bidder to the precise work as listed in these specifications and on the drawings.

ADDENDA:

The following addenda have been received, are hereby acknowledged, and their execution is included in the above proposal amount:

Addendum No	Dated	Addendum No	Dated
Addendum No	Dated	Addendum No	Dated
Addendum No	Dated	Addendum No	Dated

In submitting this bid it is understood that the right is reserved by the Owner to reject any and all bids, and it is agreed that this bid may not be withdrawn for a period of sixty (60) days after opening and recording of bids. Bids may be withdrawn at any time prior to scheduled time for opening of bids or any authorized postponement thereof.

Having carefully examined the information for bidders, the specifications, Conditions of the Contract, the project manual, and all other related contract documents including those incorporated by reference and all addenda thereto; and having personally visited the actual site location, the undersigned has satisfied himself as to all the quantities and conditions and understands that in signing this proposal, he waives all right to plead any misunderstanding regarding same.

Finally, the undersigned proposes to furnish all material, labor, tools, equipment, permits, certificates, etc. as necessary or incidental to this Bid Proposal in accordance with the said documents and to provide continuous housekeeping/clean-up and final clean-up.

CONSTRUCTION DURATION

The following work durations are proposed for the above referenced Bid Package.

Submittal	work days	
Delivery	work days	
Installation	work days	
Overall	work days	

COMPLETENESS:

The bid is inclusive and complete, representing all applicable work required for completion of the noted divisions and/or sections. The Bid is to include all of the required labor, material, and related expenses.

I hereby acknowledge that I have read and understand pages 1 through 2 constituting all of the Bid Form for the Permanent Supportive Housing.

(Signature of Bidder or Autho	rized Officer)		
me of Bidder:			
Address:			
 Date:	F	'hone:	
Attest:		Date:	
Please check below if this Co A Disadvantaged Bus	iness Enterprise	as: Yes	No
A Disadvantaged Bus A Women Business E	iness Enterprise	Yes	No No
A Minority Business E	nterprise	Yes	No
gnature			
Ho	·····		

00 43 25 - SUBSTITUTION REQUESTS

A. GENERAL

1. SEQUENCING AND SCHEDULING

- a. The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.
- b. No substitution will be considered prior to the receipt of Bids unless the following list of requirements is met.
 - 1) Submittals of proposed substitutions must be:
 - a) A written request, received by the Architect at least ten (10) days prior to the date for receipt of Bids and submitted on the Substitution Request Form
 - b) Requests shall be made in writing to the Construction Manager.
 - c) Made in good faith, that is, verifiably equal or superior to the specified items.
 - d) Submittals must include all the data that would be in construction drawings and specifications:
 - (i) Complete names and descriptions.
 - (ii) Dimensions.
 - (iii) Performance figures.
 - (iv) Latest catalogue numbers.
 - e) If new materials are named, data are provided on required laboratory tests, standards, etc.
 - f) If a new fabricator is named, data are required on capabilities and experience.
- c. The burden of proof of the merit of the proposed substitution is the responsibility of the contractor/vendor. The Architect's decision of approval or disapproval of a proposed substitution shall be final. If any of these conditions are not met, the architect may refuse to consider the proposed substitution.
- d. If the Architect approves a proposed substitution prior to the receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner. If the architect approves a bidder substitution submittal, copies of the submittal will be delivered to all other bidders so that all bids reflect the same options. APPROVALS NOT NOTED BY ADDENDUM WILL NOT BE ACCEPTED.
- e. No substitutions will be considered after the Contract Award unless specifically provided for in the Contract Documents.

END OF SECTION

00 43 43 - PREVAILING WAGE REQUIREMENTS

A. GENERAL

1. SUMMARY

a. Prevailing wage requirements for this project have been determined by the U.S. Department of Labor and have been adopted by the U.S. Department of Housing and Urban Development and the Housing Commission. Wage rates work performed at these locations will be governed by the prescribed scale of wages included herein:

Prevailing Wage Rate Determination State of Indiana, St. Joseph County General Decision No. IN20210037 Publication Date: 01/01/2021

b. Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards clauses (Title 29, part 5. CFR).

2. PREVAILING WAGES

a. Prevailing wages must be paid to all employees working on the job site. The contractor is responsible for paying the applicable wage rates and ensuring that any subcontractors pay the applicable rates. The Federal Labor Standard Provisions as well as the general wage determination must be included in subcontractors and lower-tier subcontractors' contract.

3. PAYROLL REPORT

- a. The contractor shall submit a certified payroll report and compliance statement to the Owner each week during the contract period. If no work is performed on the project during a given week, submit payrolls indicating "No Work". Weekly payrolls shall be numbered sequentially, and the final payroll marked "final". Documentation shall be provided as required by the Indiana Department of Labor and Workforce Development, Division of Wage and Hour Compliance, and HUD.
- b. On the first payroll submitted, the address and social security number must be reported for each employee, updated for each new employee used during the project.

4. ON-SITE EMPLOYEE INTERVIEWS

- a. The enforcement of labor standards provisions is as important as other requirements of the contract specifications, and that compliance with such labor standards is mandatory by contractors and subcontractors. The Owner will be on the job site conducting employee interviews to ensure compliance with Federal Regulations. Each employee must be able to show their wage rate via payroll stubs and other acceptable means.
- 5. DAVIS-BACON ACT PROCEDURES

- a. South Bend Heritage (SBH) <u>must</u> include/send form HUD-4010 with all requests for proposals to make contractors aware of the Davis Bacon compliance issue.
 - 1) This form explains that the project is being assisted with federal funds and that Federal Labor Standards Provisions apply to the project. SBHF should also include form 4010 with the contract they issue to verify that the contractor was notified of Davis Bacon and is aware of prevailing wage requirements.
- b. SBH has included the most recent Prevailing Wage Rates herein.
- c. For a contract greater than \$75,000, bids have to be solicited through a public bidding process.
- d. Bid specifications must state that the bids be submitted in sealed envelopes.
- e. A day and time must be scheduled for a public bid opening and noted in the bid specs.
 - 1) The public bid opening can be as casual as a meeting in someone's office, but a day and time must still be specified.
 - 2) A spreadsheet (bid tab) must be kept with each bidder's name and bid amount.
- f. SBH and bidders must verify the most current wage decision is in use before the bid is opened and awarded. Please contact City of South Bend staff Lory Timmer, Neighborhood Grants Manager, City of South Bend, Dept. of Community Investment; Ph.(574) 235-5844, ten (10) days prior to the scheduled bid opening.

END OF SECTION

"General Decision Number: IN20210037 01/01/2021

Superseded General Decision Number: IN20200037

State: Indiana

1

Construction Type: Residential

Counties: Elkhart, La Porte and St Joseph Counties in Indiana.

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts. including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date 0 01/01/2021

ELEC0153-008 06/08/2020

 Rates
 Fringes

 ELECTRICIAN......\$ 23.34
 16.84

 ENGI0150-040 06/01/2020
 16.84
	Rates	Fringes
POWER EQUIPMENT OPERATOR (1) Backhoe/Excavator (2) Loader	\$ 41.50 \$ 40.70	37.88 37.88
LABO0041-007 06/01/2020		
	Rates	Fringes
LABORER (2) Mason Tender - Cement/Concrete	\$ 37.15	23.48
LABO0081-008 06/01/2020		
	Rates	Fringes
LABORER (Common or General)	\$ 36.40	23.48
LABO0741-006 06/01/2020		
	Rates	Fringes
LABORER (1) Pipelayer	\$ 23.13	16.00
PAIN0460-005 06/01/2018		
	Rates	Fringes
Painters: Brush, Roller, & Spray	.\$ 25.88	23.96
PLAS0692-017 06/01/2018		
ELKHART AND ST. JOSEPH COUNTIES		
	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	.\$ 28.84	14.48
PLAS0692-030 06/01/2018		
LA PORTE COUNTY		
	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	.\$ 36.01	25.40

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PLUM0136-012 07/01/2020

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	Rates	Fringes
PLUMBER	\$ 28.21	3.06
* ROOF0026-004 06/01/2020		
	Rates	Fringes
ROOFER	\$ 38.64	21.08
SHEE0020-002 07/01/2020		
	Rates	Fringes
SHEET METAL WORKER (Excludes HVAC Duct Installation)	\$ 33.67	27.11
* UAVG-IN-0004 01/01/2019		
	Rates	Fringes
TRUCK DRIVER (Dump)	\$ 29.70	17.34
* UAVG-IN-0008 01/01/2019		
	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(BODCat/Skid Steer/Skid	\$ 32.00	30.65
POWER EQUIPMENT OPERATOR (Grader/Blade)	\$ 36.07	30.79
* UAVG-IN-0009 01/01/2019		
	Rates	Fringes
POWER EQUIPMENT OPERATOR (Paver (Asphalt, Aggregate,	¢ >< >4	20.70
SUIN2012-024 08/13/2012	D - + -	F
	катеѕ	Fringes
CARPENTER	\$ 26.95	11.49
LABORER: Mason Tender - Brick	\$ 14.00	0.00

OPERATOR: Bulldozer.....\$ 31.58

15.06

SHEET METAL WORKER (HVAC DuctInstallation Only).....\$ 26.2010.74

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

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier. A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

The request should be accompanied by a full statement of the interested party's position and by any information (wage

payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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

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

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

END OF GENERAL DECISION

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00 52 00 - AGREEMENT FORM

A GENERAL

- 1. GENERAL REQUIREMENTS
 - a. The form of agreement between the Construction Manager/GC and the Contractor shall be the **"Standard Form of Agreement Between Contractor and Subcontractor" (AIA Document A401-2007)**, as published by the American Institute of Architects.
 - b. It is the intent of the Owner to assign the bids to the Construction Manager/GC who will in turn become the contracting party. All language for the "Owner" will, therefore, be revised to read the "Construction Manager/GC."
 - c. Copies of this document are available for review at the Construction Manager/GC's office.

00 60 00 - BONDS AND CERTICATES

- A. GENERAL
 - 1. BID BOND
 - a. None required.

2. PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BONDS

- a. The successful bidder shall be required to furnish a Contract Performance Bond and Labor and Material Payment Bond equivalent to 110% of the amount of said contract, subsequent to award of contract and prior to signing of contract. This bond shall be executed on AIA Documents A311 and A312 (latest edition) or insurance company comparable form acceptable to the Owner and Construction Manager.
- b. Copies of such Documents are available from the Construction Manager's office upon request.

3. CERTIFICATE OF INSURANCE

- a. Before the execution of the contract, the successful bidder shall submit to the Contractor, evidence of *insurance on ACORD Form 25-S* "Certificate of Insurance".
- b. Certificates of Insurance are acceptable only if the Project name and Contractor name are clearly identified on the form itself and if the contractor, the owner, the construction manager, the architect/engineer, and all subcontractors are identified as co-insured. The Certificates of Insurance must name South Bend Heritage PSH, LLC (Owner), South Bend Heritage (Construction Manager/GC), Alliance Architects (Architect) and Abonmarche (Engineer) as additional insured on all liability policies.
- c. Required coverage limit are included under Section <u>00 73 00 SUPPLEMENTARY</u> <u>CONDITIONS.</u>

00 72 00 - GENERAL CONDITIONS OF THE CONTRACT

A. GENERAL

AlA Document A201/CMa "General Conditions of the Contract for Construction Manager – Advisor Edition" – latest edition, is hereby made a part of the Contract Documents. Copies of this document are available from the Construction Manager/GC's office.

00 73 00 - SUPPLEMENTARY CONDITIONS

MODIFICATIONS TO GENERAL CONDITIONS

These Supplementary Conditions supplement and amend the General Conditions of this Contract ("General Conditions of the Contract for Construction – Construction Manager – Adviser Edition)", AIA Document A201/CMa - 2007. All portions of the General Conditions not specifically amended, voided, or superseded by these Supplementary Conditions shall remain in full effect.

ARTICLE I CONTRACT DOCUMENTS

1.1.3 Add the following sentence to the end of this Paragraph: NO ASBESTOS CONTAINING MATERIAL NOR ASBESTOS OF ANY KIND SHALL BE USED WITHIN THE WORK OF THIS PROJECT.

ADD THE FOLLOWING CLAUSES TO 1.1.6:

- .1 ACCEPTABLE/EQUAL, APPROVED EQUAL The terms "as acceptable by the architect," "acceptable equal," or any other term that requires or implies acceptance or approval, shall mean acceptance in accordance with Paragraph 1.2.6, of the Supplementary General Conditions.
- .2 SIMILAR AND, OR EQUAL When the term "similar" or "or equal" is used in a Specification Section in conjunction with (a) named component object(s), the component object(s) to be considered for use in the Project by manufacturers other than those specified, require Architect review and acceptance either during the bid period or after award of the Contract.

ADD THE FOLLOWING CLAUSE TO 1.1.7

.1 CONTRACT DOCUMENTS One complete set of Contract Documents includes this Project Manual, the Construction Drawings, Specifications, and all Addenda.

ADD THE FOLLOWING TO PARAGRAPH 1.2.3

In the event of conflicts or discrepancies among the Contract Documents, the Documents shall be interpreted on the basis of the following priorities:

First:	Agreement
Second:	Supplementary General Conditions
Third:	General Conditions
Fourth:	Drawings and Specifications
Fifth:	Other Contract Documents

In drawings, large scale details shall govern smaller scale drawings. In case of conflicts between drawings and specifications, or within either the drawings or specifications, the Architect may interpret the Documents so as to secure the most substantial and comprehensive performance of the work consistent with the intent and requirements of the Contract, and such work shall be performed by the contractor without extra cost to the Owner. It is understood that in the event of unresolved discrepancies, the Contractor shall have bid the most expensive material or method in each case.

ADD THE FOLLOWING SUBPARAGRAPHS TO 1.2

- 1.2.6 If a duplication of material or equipment occurs in the Drawings or the Specifications by assignment of Work to separate prime contracts, each Prime Contractor shall be deemed to have bid on the basis of each furnishing such material or equipment. The Construction Manager will decide which Contractor(s) shall furnish the same and which contract amount shall be adjusted for not incorporating such material or equipment into the Project.
- 1.2.7 Material and equipment incorporated in to the Project which by their nature are governed by OSHA regulations, shall conform to said OSHA regulations for both manufacturer and installation. If, during the progress of the Work it is discovered that installation does not conform to said OSHA regulations, the Contractor shall take such steps as necessary to comply, at no additional cost to the Owner.
- 1.2.8 Materials incorporated into the Project must be as specified, or, acceptable by the Architect in writing during the bid period and before the bid due date, unless provisions under Subparagraph 1.1.6, Article 1, of the Supplementary General conditions are provided for in a particular technical Specification Section. See Section 01 25 13.
- 1.2.9 .1 After first including in the bid, material specified or reviewed and acceptable by the Architect, the bidder may ADDITIONALLY, at his option, submit a voluntary alternate along with the bid, stating the optional material and/or methods which the bidder proposes to use, together with the difference in cost from that basically specified, and all brochures, data manuals, etc., describing the specifics of such materials or equipment. The Architect, CM, and Owner reserve the right to accept or reject such options.
 - .2 If the Drawings disagree within themselves or with the Specification Manual, the better quality or greater quantity of work or materials shall be estimated upon, and, unless specified in writing, shall be provided.

ARTICLE 2 OWNER

- 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK
- 2.4.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY, AND SUBSTITUTE THE FOLLOWING:

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within seventy-two (72) hours after receipt of written notice from the Owner or CM/GC to commence and continue correction of such default or neglect with diligence and promptness, the Owner or CM/GC may, after forty-eight (48) hours following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the Owner may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's and the CM/GC's additional services made necessary by such default, neglect or failure. Such action by the Owner or CM/GC and the amount charged to the Contractor are both subject to the prior approval of the Architect, after consultation with the CM/GC. If the payments then or thereafter due the Contractor shall pay the difference to the Owner.

ADD THE FOLLOWING SUBPARAGRAPHS TO 2.4:

- 2.4.2 The Owner reserves the right to go on this project and do work which is not connected with the Contract. This means the Owner has the right to install his own (office equipment, exhibit materials and equipment, furniture and things of similar nature) while the building is being constructed as long as this work does not hinder the progress of the Contractor on the project. If the work by the Owner hinders the progress of the Contractor or creates undue hardship for the Contractor in fulfilling the contract obligations, the Contractor shall notify the Construction manager, in writing, within a period of five (5) working days of the occurrence, stating the amount of delay or cost burden along with the specific causes.
- 2.4.3 The Construction Manager/GC reserves the right to act on behalf of the Owner pertaining to the clean-up responsibilities that are a part of each Contractor's work. Article 3.15, "Cleaning-up" included in the General Conditions and the statement concerning clean-up which is included in each Contractor's Scope of Work, will serve as the required notice called for in Section <u>01 11 01 SUMMARY OF WORK</u>.
- 2.4.4 The Owner shall have the right to take possession of, or use, any completed or partially completed part of the work. Such possession or use shall not hinder the progress of the Contractor. The Owner shall be responsible for all damages to the completed work as a result of his occupancy."
- 2.4.5 In the event that workers performing Work under this Contract engage in a strike or other work stoppage or cease to work due to picketing or a labor dispute of any kind, the failure of the Contractor to cause those workers to resume work or the failure to provide other properly skilled workers shall be construed as neglecting to carry out the Work in accordance with the Contract Documents and the Owner may take action as described above.

ARTICLE 3 CONTRACTOR

ADD THE FOLLOWING SUBPARAGRAPHS TO 3.4

- 3.4.3 Each Prime Contractor shall provide a list for approval under the conditions set forth in the General Requirements of the Specifications, showing the name of the manufacturer, and other information where required, proposed to be used for each of the products identified in the General Requirements of the drawings and specifications which apply to their portion of the work.
- 3.4.4 Products are generally specified by ASTM or other referenced standard, and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product or manufacturer as specified as being equally acceptable. The Contractor has the option of using any product and manufacturer combination listed. (When only one product and manufacturer is specified, this is the basis of the Contract, without substitution or exception.)
- 3.4.5 After the Contract has been executed, the Owner, Architect, and Construction Manager/GC will consider a formal request for substitution of products in place of those specified only if the product is not available or not available within the time frame of the project, under the following conditions:
 - a. The request is accompanied by complete data on the proposed substitution substantiating compliance with the Contract Documents, including product identification and description, performance and test data, reference, and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to contract time,

schedule, design and artistic effect where applicable and its relationship to separate Contracts.

- b. The request is accompanied by accurate cost data on the proposed substitution in comparison with the product specified, whether or not modification of the Contract sum is to be a consideration.
- 3.4.6 Request for substitution based on Clause 3.4.5 above, when forwarded by the Contractor to the Architect and Construction Manager/GC, are understood to mean the Contractor:
 - a. represents that he has personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified.
 - b. will provide equal or better guarantee for the substitution that he would for that specified.
 - c. certifies that cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate Contracts and the Architect's redesign costs, and that he waives all claim for additional costs related to the substitution which subsequently become apparent.
 - d. will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.
- 3.4.7 Substitutions will not be considered if:
 - a. they are indicated or implied on shop drawings submissions without the formal request required in Clause 3.4.5.
 - b. for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.
- 3.4.8 All Contractors or subcontractors who are signatory to any union agreement shall observe all established union rules and regulations, and/or state and local laws and regulations, and shall cooperate with the labor union officials toward elimination and/or settlement of all labor disputes, in order to insure an even and uninterrupted rate of progress in the work.
- 3.4.9 All Contractors and subcontractors employed on the work shall be required to conform to the governing labor laws and the various acts amendatory thereto, and all other laws, ordinances and legal requirements applicable thereto.
- 3.4.10 The Contractor or his subcontractors shall not discriminate in hiring or any matter of employment by reason of sex, race, color, religion, handicap, ancestry, or national origin. Submission of a bid on this project is implied acceptance of the inclusion of this clause in all Contract Documents.
- 3.5 WARRANTY
- 3.5.2 ADD THE FOLLOWING: "...All specific warranties or bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in the General Conditions, shall be furnished in accordance with the requirements of the Specifications."
- 3.5.2 ADD THE FOLLOWING CLAUSES:

".1 The Contractor shall and does hereby agree to warrant for a period of one (1) year, or for longer periods, where so provided in the Technical Specifications, as evidenced by the Date of Substantial Completion issued by the Architect, all products installed under the Contract to be of good quality in every respect and to remain so for periods described herein."

".2 Should any defects develop in the aforesaid Work within the specified periods, due to faults in products or their workmanship, the Contractor hereby agrees to make all repairs and do all necessary work to correct defective work to the Architect's satisfaction. Such repairs and corrective work, including costs of making good all other Work damaged by or otherwise affected by making repairs or corrective work, shall be done without cost to the Owner and at the entire cost and expense of the Contractor within fourteen (14) days after written notice to the Contractor by the Owner and/or the Construction Manager/GC."

3.6 TAXES

ADD THE FOLLOWING SUBPARAGRAPHS to 3.6

- 3.6.2 Materials and properties purchased pursuant to contracts with the Owner that become a permanent part of the structure or facilities constructed **are** subject to the Indiana Gross Retail Tax (Sales Tax).
- 3.6.3 If the Contractor is an out-of-state corporation, it shall furnish to the Owner, prior to contract execution, a certificate from the Secretary of State of Indiana as evidence that the Corporation is registered and authorized to transact business in the State of Indiana.
- 3.7 PERMITS, FEES, AND NOTICES

3.7.1.1 ADD THE FOLLOWING PARAGRAPH: Contractors will be obligated to obtain all required permits and inspections necessary by governing agencies. The Owner will provide the State Plan Release and related filing fees.

- 3.7.1.2 Each Contractor shall pay for all permits, bonds, governmental fees and licenses necessary for the proper execution and completion of his Work, which are applicable at the time the bids are received. All fees to relocate utilities on Owner's property shall be included in the Bid of the Contractor doing the relocation. Permits shall include, but not be limited to, Drainage, Technical, Planning & Zoning, Sanitary Sewer hook up, and the Indiana Department of Environmental Management (Approximately 60 days process).
- 3.7.3 DELETE FIRST SENTENCE.
- 3.8 ALLOWANCES

ADD THE FOLLOWING SUBPARAGRAPH TO 3.8:

- 3.8.3 Additional provisions pertaining to cash allowances are included in Division <u>1 GENERAL</u> <u>REQUIREMENTS.</u>
- 3.9 SUPERINTENDENT

ADD THE FOLLOWING SUBPARAGRAPH TO 3.9:

- 3.9.2 The superintendent shall be satisfactory to the Construction Manager/GC and shall not be changed except with the consent of the Construction Manager/GC, unless the superintendent proves to be unsatisfactory to the Contractor or ceases to be in his employ.
- 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULE
- 3.10.1 DELETE IN ITS ENTIRETY AND INSERT: The Construction Manager/GC will prepare a schematic Construction Schedule for the Work as part of the Construction Documents. The Contractor shall provide Construction Schedules for the Work within his contract for entering into overall project construction schedule to be reviewed at progress meetings. The Milestone Schedule is noted in Section 00 31 00 INFORMATION AVAILABLE TO BIDDERS.

ADD THE FOLLOWING SUBPARAGRAPH TO 3.10:

- 3.10.5 Additional provisions pertaining to the progress schedule are included in Division 1, General Requirements.
- 3.11 DOCUMENTS AND SAMPLES AT THE SITE

ADD THE FOLLOWING SUBPARAGRAPH TO 3.11:

- 3.11.2 Additional provisions pertaining to project record documents are included in Division 1, General Requirements.
- 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- 3.12.4 ADD THE FOLLOWING TO THIS PARAGRAPH: Contractor shall submit material safety data sheets on all material, equipment and products incorporated within this Project certifying that no asbestos is incorporated in the building.

ADD THE FOLLOWING SUBPARAGRAPH TO 3.12:

- 3.12.12 Additional provisions pertaining to shop drawings, product data, and samples are included in Division 1, General Requirements.
- 3.13 USE OF SITE

ADD THE FOLLOWING SUBPARAGRAPH TO 3.13:

- 3.13.3 Use of site shall be based upon approval from the Construction Manager/GC to each Contractor's requests and/or as outlined on the site plan of the Construction Documents, or contained in the Project Manual.
- 3.14 CUTTING AND PATCHING OF WORK

ADD THE FOLLOWING SUBPARAGRAPH TO 3.14:

- 3.14.3 Additional provisions pertaining to cutting and patching of the work are included in Division <u>1 GENERAL REQUIREMENTS</u>.
- 3.15 CLEANING UP

3.15.1 DELETE SUBPARAGRAPH AND SUBSTITUTE THE FOLLOWING:

The Contractor shall, on a daily basis, keep the premises free from accumulation of waste materials or rubbish caused by its operations and keep its areas worked in broom clean and neat and orderly, and shall include such cost in the bid. Should the Contractor fail to comply with the daily clean up requirement, the Owner or CM may order the daily clean up to be performed by an independent agent, the cost of which shall be deducted from the Contractor's monthly progress payments.

3.15.2 DELETE SUBPARAGRAPH AND SUBSTITUTE THE FOLLOWING:

The Contractor shall cooperate with other Contractors in keeping its daily used materials stored in a neat and orderly fashion, so as not to cause undue hardship or jeopardize the safety of working conditions, or delay in work by other Contractors. No more than one (1) week's storage of materials to be installed may be located in the building. On site exterior storage is permitted at a location approved by the Construction manager.

ADD THE FOLLOWING SUBPARAGRAPHS TO 3.15:

- 3.15.3 The CM/GC will designate on the site, a central waste area. The Contractor shall convey all daily waste materials or rubbish and debris generated by his operations to the central waste area, and deposit said material or rubbish and debris in containers furnished by the CM.
- 3.15.4 The Contractor(s) shall be responsible for maintaining the central waste area in reasonably neat order at all times as adjudged by the CM.
- 3.15.5 The Contractor shall, at the completion of his Work, remove all remaining waste materials, rubbish and debris. The Contractor shall remove from the site all excess materials, tools, construction equipment, machinery, sheds or trailers.
- 3.15.6 Should the Contractor not perform his cleanup requirements satisfactorily, the Owner or CM shall have the right to hire the Contractor's clean-up work performed, the cost of which shall be deducted from the Contractor's final payment, in accordance with Paragraph 6.3 of the General Conditions.
- 3.15.7 Additional provisions pertaining to cleaning up are included in Division 1 GENERAL REQUIREMENTS.
- 3.18 INDEMNIFICATION
- DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY AND REPLACE WITH THE 3.18.1 FOLLOWING... "The Contractor and Subcontractor (hereinafter "Indemnitors") hereby agree to indemnify, save, and hold harmless, and defend at its own expense, the Construction Manager/GC, Owner, and Architect performing services on this Project, their respective partners, agents, employees, and anyone else acting for or on behalf of any of them, and any other person or entity for whom any of them may be legally responsible, (herein collectively called "Indemnitees"), against all claims, losses, damages, suits, costs, and expenses, including attorney's fees or actions of any nature whatsoever, which arise out of, result from, or are related to or are alleged to arise out of, result from or relate to the Project, including the Work to be performed by either of the Indemnitors; including all liability for damages, loss, costs, expenses, claims, including death, damage to property, damages to any Indemnitee or Indemnitor or its employees, servants, and agents, whether based upon, or claimed to be based upon, statutory, contractual, tort, or other liability of any Indemnitee whether or not caused, or alleged to be caused, in whole or in part, by the joint or several, negligence (but not sole negligence) breach of contract, breach of

warranty, strict liability of other breach of duty by any Indemnitee. In the event more than one Indemnitor is responsible or alleged to be responsible in respect to an accident or occurrence covered by this Indemnification, then all of such Indemnitors shall be jointly and severally responsible to the Indemnitees for indemnification, and the ultimate responsibility among such Indemnitors for the loss and expense of any such indemnification shall be settled by separate proceedings and without jeopardy to any Indemnitee."

The Contractor is solely responsible for all citations and penalties arising out of, or resulting from, the performance of the work under his Contract.

The Contractor shall indemnify and hold harmless the Owner, the Architect, the Construction Manager/GC and their agents and employees from and against all claims, damages, losses and expenses, including attorney's fees, arising out of such Occupational Safety and Health Act violations and other applicable ordinances, rules, and regulations outlined in Article 10.

ARTICLE 4 ADMINISTRATION OF THE CONTRACT

4.6.2 ADD THE FOLLOWING CLAUSES:

".1 The Construction Manager/GC shall be given purchase orders and order acknowledgments for materials and/or equipment are being ordered to comply with the most up-to-date construction schedule. Anticipated delivery dates must be noted on all purchase orders. The Construction Manager/GC will not assume or relieve the Contractor of the responsibility of the completeness or content of the purchase order."

".2 The Construction Manager/GC shall not be responsible to any Contractor, Subcontractor, or material Supplier for changes in the Contract Time or Construction Schedule that are created by acts of negligence by the Contractors or their agents and/or are not directly controlled under the authority of the Construction Manager/GC.

4.7 CLAIMS & DISPUTES

4.7.3 AMEND SUBPARAGRAPH AS FOLLOWS:

Change "twenty-one (21) days" to "fourteen (14) days" in this paragraph. Add the following statement to the end of this subparagraph:

"In the case of continuing delay, the claim along with estimated associated costs must be updated weekly and submitted to the Construction Manager/GC for the duration of the delay."

ARTICLE 5 SUBCONTRACTORS

5.2 AWARDS OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 DELETE THE FIRST SENTENCE OF THIS PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

The low bidders, within forty-eight (48) hours after notification, shall submit to the Construction Manager/GC a complete list of subcontractors, suppliers and manufacturers furnishing and/or installing materials and products (including those who are to furnish materials or equipment fabricated to a special design) specified on this project. The list shall be complete with names, addresses, city, state, zip codes, telephone and fax numbers."

b. Contractor shall keep his Bonding Company informed of any and all changes in amount of his contract with the Owner and shall furnish the Construction Manager/GC with copies of all notices of such changes upon request.

ARTICLE 7 CHANGES IN THE WORK

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY AND SUBSTITUTE THE FOLLOWING:

In Subparagraph 7.2.1 and 7.2.2 the allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the followed schedule:

- a. For the Contractor, for any Work performed by the Contractor's own forces, ten percent (10%) of the cost.
- b. For the Contractor, for Work performed by his subcontractor, five percent (5%) of the amount due the subcontractor.
- c. For each subcontractor or sub-subcontractor involved, for any Work performed by that Contractor's own forces ten percent (10%) of the cost.
- d. For each subcontractor, for Work performed by his sub-subcontractors, five percent (5%) of the amount due the sub-subcontractor.
- e. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.3.
- f. In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontractors. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also. In no case will a change involving over \$100.00 be approved without such itemization.
- g. For deduct Change Orders not signed by the Contractor, the construction Manager will hold funds equal to the deduct until signed.
- h. On costs charged against allowances and contingencies, there will be no mark ups.

ARTICLE 8 TIME

- 8.1 DEFINITIONS
- 8.1.1 After the words, "of time allotted in the", add, "construction progress schedule included in "Contract Documents."

8.1.3 AMEND SUBPARAGRAPH TO READ:

"The Date of Substantial Completion of the Work or designated portion thereof is the date on which the Owner receives the certification from the CM/GC and the Architect that the construction is sufficiently complete, in accordance with the drawings, details, and Project Manual, as modified by any completed change orders agreed to by the parties, so the Owner can occupy or use the Work for the use for which it was intended. The warranty period shall commence no earlier than the Date on which the Owner receives the Certificate of Substantial Completion of the Project.

8.1.3.1 ADD THE FOLLOWING CLAUSE:

As between the Owner and the Contractor, as to all acts or failures to act occurring prior to the relevant Date of Substantial Completion of the Work, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such.

Date of Substantial Completion of the Work; as to all acts or failures to act occurring subsequent to the relevant Date of Substantial Completion of the Work, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment.

8.1.4 AMEND SUBPARAGRAPH TO READ:

The Date of Substantial Completion of the Project or designated portion thereof is the Date on which the Owner receives the certification from the Architect that the construction is sufficiently complete in accordance with the drawings, details, and Specification Manual, as modified by any completed change orders agreed to by the parties, so the Owner can occupy or utilize the Project or designated portion thereof for the use for which it was intended.

- 8.2 PROGRESS AND COMPLETION
- 8.2.1 ADD THE FOLLOWING SENTENCE: "All time limits stated in the construction schedule included in Contract documents are of the essence of the Contract."

ADD THE FOLLOWING SUBPARAGRAPHS

- 8.2.4 Each prime contractor, subcontractor, and/or material company shall furnish sufficient labor forces, construction plant and equipment, temporary heat, enclosures, etc., required for their work and protection unless specified elsewhere, and shall work such hours, including night shifts and overtime operations as may be necessary to insure the prosecution of the work in accordance with the approved current progress schedule. If, in the opinion of the Construction Manager/GC, the Contractor falls behind the progress schedule, the Contractor shall take such steps as may be necessary to improve his progress and the Construction Manager may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant, all without additional cost to the Owner. Failure of the Contractor to comply with the requirements of the Construction Manager/GC under this provision shall be grounds for determination by the Construction Manager/GC under this provision shall be grounds for determination by the Construction Manager/GC that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination, the Owner or CM shall have the right, without limiting any other right he may have to either not approve reduction of retainage or to terminate the Contractor's right to proceed with the work or any separable part thereof.
- 8.2.5 Timely performance is an expressed condition of the contract and any delay in the Contractor's performance may excuse the Owner from its obligation to perform. Failure to abide by the time condition may be treated as a breach of contract.

8.3.3.1 ADD THE FOLLOWING CLAUSE:

In the event the Contractor is deemed by the Construction Manager/GC as unable to meet the Project Construction Schedule because of the failure of any of the contractor's suppliers and/or subcontractors to timely deliver materials, equipment and labor for the project, the Contractor agrees that the Construction Manager shall be authorized, on behalf of the Contractor, to deal directly with such delinquent suppliers and/or subcontractors. The Contractor shall take such actions as the Construction Manager/GC shall request to assist the Construction Manager in dealing with such delinquent suppliers and/or subcontractors in such manner as the Construction Manager/GC shall deem necessary for the completion of the project, which may include, but shall not be limited to the termination of such delinquent suppliers and/or subcontractors and the issuance of replacement orders to other suppliers chosen by the Construction Manager/GC on behalf of the Contractor. Any expediting measures carried out by the Construction Manager do not relieve the Contractor of his obligations. No additional costs will be passed on to the Owner as a result of the failure of Contractor's suppliers or subcontractors to meet their obligations.

ARTICLE 9 PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

ADD THE FOLLOWING CLAUSES:

be acceptable as stored materials.

- 9.2.1.1 Within ten (10) days of contract award, the contractor shall furnish a schedule of values to the Construction Manager/GC on AIA Document G703; for approval.
- 9.2.1.2 The schedule of values should include sufficient details to enable the Construction Manager/GC to correlate progress of work with the payment applications. The schedule of values shall include a breakdown between labor and materials, and categorized by the work activities of each bid package contract as shown in this construction schedule provided in the Contract Documents.
- 9.3 APPLICATIONS FOR PAYMENT

9.3.1 DELETE THIS PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

....."Applications for Payment shall be made no later than the 25th day on the month through the Construction Manager/GC to the Owner. Payment to the Contractor will not be made until the final approval by the Owner. Applications made by the 25th of the month, if approved, will be paid approximately thirty (30) days later. The Contractor shall submit to the Construction Manager/GC, in duplicate, an itemized Application for Payment, supported by such data, such invoices substantiating the Contractor's right to payment as the Owner, Architect, or Construction Manager/GC may require. Contractors shall utilize Application Payment Form AIA G702/Cma. The first Application for Payment shall not be acceptable until the Construction Manager/GC has given written approval of the schedule of values breakdown as specified in Article 9.2.

9.3.2 ADD NEW PARAGRAPHS TO 9.3.2 AS FOLLOWS: Contractors may receive payments for materials suitably stored on site provided the items are organized, protected from the elements, grouped together and can be counted in a reasonably period of time. In addition, contractors may receive payments for materials stored offsite in an insured location, provided that proof of insurance is provided with the Application for Payment. Miscellaneous items such as screws, clamps, nails, etc., will not

Where circumstances indicate that the Owner's best interest is served by off-site storage, the Contractor shall make written request to the Architect for approval to include such material costs in his next progress payment. The Contractor's request shall include the following information:

.1 A list of the fabricated materials consigned to the project (which shall be clearly identified), giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.

.2 Certification that all items have been tagged for delivery to the project and that they will not be used for any other purpose.

.3 A letter from the bonding company indicating agreement to the arrangements and that payment to the contractor shall not relieve either party of their responsibility to complete the facility.

.4 Evidence of adequate insurance covering the material in storage.

.5 Any costs incurred by the Architect or Construction Manager/GC to inspect material in off-site storage outside a 25 mile limit of the project site shall be paid by the Contractor.

.6 When a partial payment is allowed on account of material delivered on the site of the Work or in the vicinity thereof or under the possession and control of the Contractor, but not yet incorporated therein, such material shall become the property of the Owner, but if such material is stolen, destroyed, or damaged by casualty before being used, the Contractor will be required to replace it at his own expense.

Until materials are properly incorporated into the Work, The Owner will pay 95% of the amount(s) submitted by the contractor on his monthly application for payment and/or as approved by the Architect, for materials suitably stored off-site or on the site (5% remainder is retainage).

The above submittal is contingent on those items being suitably stored in the contractor's warehouse and that all parties are in agreement. All materials stored off site for which the Contractor is requesting payment will require inspection by the Architect and/or Construction Manager.

ADD NEW PARAGRAPH TO 9.3.3 AS FOLLOWS:

WAIVER OF LIEN

Each Contractor must provide Partial Waivers of Lien for themselves and from all suppliers with each Application for Payment. Each Contractor must further provide final Waivers of Lien for themselves and from all suppliers before final payment will be made.

The waivers for suppliers shall cover disbursements made from the previous payment request. Lien forms may be obtained from any local office supply business.

- 9.7 FAILURE OF PAYMENT
- 9.7.1 AMEND THIS SUBPARAGRAPH AS FOLLOWS: Delete final sentence of this subparagraph.

9.10.2 SUPPLEMENT WITH THE FOLLOWING: "...The Contractor shall furnish such evidence as may be necessary to show that any out-of-state subcontractor or supplier has fully met the requirements of payment of taxes as established in any law of the State or local subdivision thereof which may be in effect at the time of final payment. The Owner will require the submission of such proof or evidence before final payment will be approved or made. The following must be submitted to the Construction Manager/GC before approval of final payment.

.1 Affidavit of Payment as required under this paragraph shall be in the form of AIA Document G706- Contractor's Affidavit of Payment of Debts and Claims.

.2 Release of liens as required under this paragraph shall be in the form of AIA Document G706A-Contractor's Affidavit of Release of Liens.

.3 Consent of Surety as required under this paragraph shall be in the form of AIA Document G707- Consent of Surety Company to Final Payment.

- .4 Submit releases and final unconditional waivers of lien."
- 9.10.3 SUPPLEMENT WITH THE FOLLOWING: "...final payment, constituting the unpaid balance of the contract sum shall be paid to the Contractor in full, including any retainage not less than sixty-one (61) days following the Date of Substantial Completion. If at that time there are any remaining uncompleted items, an amount equal to two Hundred percent (200%) of the value of each item as determined by the Architect and the Construction Manager shall be withheld until said items are completed and a Final Certificate of Payment issued by the Architect and Construction Manager."

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 ADD AT THE END OF SUBPARAGRAPH THE FOLLOWING:

- Safety precautions shall include, but are not limited to, removal of water, snow, and ice. Further, the Contractor shall conform to the safety and health standards for construction as set forth in the Federal Register publication for the Occupational Safety and Health Administration, Department of Labor, titled Bureau of Labor Standards "Safety and Health Regulations for Construction", and any state or local regulations or codes governing or providing for the safety and health of employees and the general public. This includes all OSHA safety requirements for the specific type of work of condition built by the Contractor. All contractors shall perform the recommendations of safety inspections, **and wear hard hats at all times while working within construction limits.**
- 10.2 SAFETY OF PERSONS AND PROPERTY
- 10.2.1 ADD THE FOLLOWING CLAUSES:

.5 All work, materials, apparatus and fixtures, which may be caused by weather (rain, winds, storms, frost and heat).

.6 Excavated backs, trenches and/or the building from damage from rainwater, spring water, groundwater, backing up of drains of sewers and all other water admitted to the work by his operation. He shall provide all pumps and other equipment and enclosures to provide this protection. In the case of any work involving a trench greater than five feet in depth, IOSHA regulations shall prevail (IC.36-1-12-20).

10.2.2 ADD THE FOLLOWING CLAUSES:

.1 The Contractor shall conform with the United States Department of Labor and Indiana Division of Labor Occupational Safety and Health Administration regulations.

.2 The Contractor shall have their Hazard Communication Program in effect with all their personnel working on the project. All Material Safety Data Sheets should be current as required by law.

- 10.2.3 ADD THE FOLLOWING: Additional protection shall be taken when (i) utilities cross existing streets, drives, lawn, shrubs, etc., (ii) repair or replace to original conditions as approved by Owner, Architect and CM. In streets, roads, highways, work to be as directed by City Engineer, County or State Highway Department.
- 10.2.5 Twice in Subparagraph 10.2.5, change "Clauses 10.2.1.2 and 10.2.1.3" to read "Clauses 10.2.1.2, 10.2.1.2, 10.2.1.3, and 10.2.1.4.
- 10.2.5.1 ADD THE FOLLOWING CLAUSE: Should the Contractor within twenty-four (24) hour notice fail to remedy all damage or loss (other than damage or loss insured under Paragraph 11.3) to property referenced in Provision 10.2.5, the Construction Manager/GC shall have the right to remedy the situation and the cost thereof will be back-charged to the contractor responsible for the damage or loss.
- 10.2.8 ADD THE FOLLOWING SUBPARAGRAPH: At all times during the construction and/or erection of the project and/or its component parts, prior to the completion of the structural frame of this project and/or the placement and permanent connection of the component members of the structural frame, each Contractor shall provide, install and maintain properly designed and constructed temporary bracing of adequate strength to prevent dislocation, distorting, cracking, failing of, or any other damage to their work on the project and/or its component parts due to excessive, wind forces.

ARTICLE 11 INSURANCE & BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 FIRST SENTENCE FOLLOWING THE WORDS "SET FORTH BELOW," MODIFY AS FOLLOWS:

..."in a company or companies with ratings of no less than A as determined by A.M. Best Company licensed to do business in the state where the project is located and to which the Owner has no reasonable objection..."

ADD TO PARAGRAPH:

Before starting work, the contractor shall furnish to the Owner, through the CM/GC and a copy to the Architect, duly executed certificates of all required insurance on the latest edition of AIA Form G705 or on ACCORD Form. The certificates shall also state that such insurance is in force and cannot be canceled or released except upon thirty (30) days prior written notice to the Owner, through the CM with a copy to the Architect. All policies shall be written specifically for this Project, with the name of the Project on said policies.

It shall be the Contractor's responsibility to provide the Owner with written certification of renewal of insurance in sufficient time so as to be in possession of the Owner no later than

fifteen (15) days prior to policy expiration date. The Contractor shall provide the CM and the Architect with a copy of said renewal certification. Allowing the insurance to expire is a breach of contract on the part of the Contractor and shall be grounds to immediately stop the work by direction of the Owner. No work shall proceed until renewal insurance has been reviewed and approved by the Owner.

All insurance required under this Article 11 shall remain in effect for a period of one (1) year from date of substantial Completion. The Owner, CM/GC, Architect, Engineers and Tenant shall be as named additional insureds on all liability policies.

11.1.2 DELETE FIRST SENTENCE IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING: "...The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits and requirements or required by law, whichever is greater and with the Owner, the Trustee, its assignee, the Architect, the Engineer, the Construction Manager, and their consultants, names as "Additional Insureds" on the insurance policy.

11.1.2.1 ADD THE FOLLOWING CLAUSE:

- 1. Prior to commencement of any work and prior to the performance of any service, the Contractor shall procure and pay for the following insurance coverages, and the Contractor shall maintain them in force after his work is completed and accepted for final payment and throughout the one (1) year guarantee period. The insurers and policies shall be subject to the Owner's approval.
- 2. Workmen's Compensation
 - a. Statutory Workmen's Compensation and Occupational Disease Insurance with all elective employments covered and all excluded employments covered on a voluntary basis where permissible.
 - b. The Workmen's Compensation policy shall contain the following endorsement, unless specifically prohibited by compensation insurance authorities having jurisdiction:

"Whereas, Contractor may undertake to perform work for the Owner; and, whereas, said Owner may exercise some degree of jurisdiction or control over the employees of Contractor engaged in such work, it is agreed that, subject to the conditions and limitations of this policy, said Owner is named as an additional insured employer under this policy, but only with respect to employees of Contractor whose names appear on the payroll records of Contractor while performing such work for said company."

- 3. Bodily Injury and Property Damage Liability
 - a. The liability policy shall be on a comprehensive liability form and shall include, but not be limited to, coverage for all operations of the Contractor, including automobile, premises, contractual liability, completed operations liability, Contractor's protective liability and contingent liability for the operations of subcontractors.
 - b. The Contractor shall effect and maintain insurance covering himself or his agents, the Owner or its assignee, the Trustee, the Architect/Engineer, the Construction Manager and their consultants against all claims, demands or actions arising under the Indiana

Workmen's Compensation Law against all other claims, demands or actions for injury to, or death of, persons and damage to property, and will furnish the Owner with certificates showing the following coverages in complete satisfaction to the Owner.

- 1) Worker's Compensation Insurance, Occupational Disease Insurance and Employer's Liability Insurance for all employees engaged in the work under this agreement.
- Comprehensive General Liability Insurance, including Contractor's protective Liability, Completed Operations, Blanket Contractual and Personal Injury Liability, and Coverage as Respects the Explosion, Collapse, and Underground Hazards:

Bodily Injury and Property Damage (including explosion, collapse and undermining coverage)	\$1,000,000 each occurrence
Automobile Bodily Injury and Property damage Liability	\$1,000,000 each occurrence
Umbrella Liability Coverage	\$2,000,000 aggregate limit

The combination of Primary and excess Limits shall meet and/or exceed the above required limits. The insurance coverage provided should meet the exposures relating to the type of work performed.

c. Indemnification: See Article 3.18 "Indemnification" on Page 6 of AIA Document A201/Cma, "General Conditions of the Contract for Construction", 1992, edition.

3)

d. The policy of insurance referred to above shall contain the following endorsement:

"It is further understood and agreed that the coverage of this policy shall not be cancelled or reduced by the company until the company has mailed written notice to Owner stating when, but in no case less than thirty (30) days thereafter, such cancellation or reduction in coverage shall be effective."

The Contractor shall indemnify and hold harmless, the Owner or assignee, Construction Manager/GC and Architect, and their agents and employees in accordance with Article 3.18, "Indemnification" of the General Conditions of the Contract for Construction, AIA Document A201/Cma, 1992, edition.

The policy provided by the Contractor shall provide coverage for the professional acts of that Contractor.

For the duration of this Contract, Contractor shall maintain Comprehensive Automobile Liability Insurance for all owned, non-owned and hired vehicles.

Contractor shall require subcontractors to provide Comprehensive Automobile Liability Insurance with same minimum limits.

Contractor shall not commence work at the site under this Contract until he has obtained all required insurance, and until such insurance has been approved by the Owner and Construction Manager/GC. The Contractor shall not allow any subcontractor to commence work until all insurance required has been obtained and approved. Approval of the insurance, by the Owner and Construction Manager, shall not relieve or decrease the liability of the contractor hereunder. Certificates of Insurance shall be filed, with the Owner and Construction Manager/GC prior to commencing work.

The Contractor shall be responsible for his subcontractors to obtain the required insurance prior to commencing work.

<u>Proof of Carriage</u>: The Contractor shall furnish the Owner and Construction Manager/GC with satisfactory proof of carriage of the insurance required. Contractor shall furnish to Owner and Construction Manager/GC certificates issued by the Industrial Board of the State of Indiana (Form Number 19 and 105) as proof of compliance with Workmen's Compensation and Occupational Disease Insurance as provided under the Laws of the State of Indiana. No work shall be started by either Contractor or subcontractor until such certificates are delivered. Owner reserves the right to stop work in all cases where such renewal certificates and insurance policies are not delivered to Owner prior to the expiration date shown on the policies and/or certificates.

All Contractors' insurance policies shall name the Owner and/or its representatives or assignees, the Trustee, the Architect/Engineer and Construction Manager/GC and their consultants as additional insureds, and shall deliver evidence of such insurance to the Owner through the Construction Manager.

ADD THE FOLLOWING SUBPARAGRAPHS TO 11.1:

- 11.1.4 "Furnish one copy of the certificate for each copy of the Contractor Subcontractor Agreement. Specifically set forth evidence of all insurance required of the Contractor by this Article 11. The form of the certificate shall be AIA Document G705, ACORD Form 25 or Form 25S, current edition. Furnish copies of any endorsements that are subsequently issued amending coverage or limits."
- 11.1.5 The Contractor's owned, leased, hired and/or borrowed equipment, supplies, and materials stored on or off site, and tools, not forming a part of or incorporated into the Work, is not covered by the Construction Manager/GC's Builders Risk Insurance. Therefore, the Contractor shall determine whether or not he desires coverage for same, and, if so, shall provide coverage at his own expense.

The Contractor, lender, or other type of owner of said mentioned equipment, shall not have claim against the Owner of this Project, for any reason whatsoever, for loss of such equipment mentioned above which is used on this Project.

- 11.2 OWNER'S LIABILITY INSURANCE
- 11.2.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY

11.3 PROPERTY INSURANCE

11.3.1 ADD THE FOLLOWING:

Builder's All Risk- The Construction Manager/GC shall purchase and maintain Builders Risk Property Insurance upon the entire Work at the site for One Hundred (100%) percent of the full value thereof, and shall include the interests of the Owner, trustee, Architect/Engineer, Construction Manager/GC, Tenant, Contractors, subcontractors and lower tier contractors in the work and shall issue against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft vandalism and malicious mischief of those items incorporated into the Works.

Said insurance shall cover the building under construction and all materials which are incorporated into the work. The Owner and Contractors waive all rights against each other for damages caused by the perils covered by such insurance.

Equipment of the Contractors and materials which are not yet incorporated into the building will not be insured by the Owner. Nothing herein shall be construed as prohibiting the Contractors from placing insurance coverage on such property, if they so desire.

Furthermore, it is the Contractor's responsibility to insure himself against those claims for theft, vandalism and other such items which are not contained in the Owner's Builder's Risk Policy. Each Contractor shall insure himself against claims for the theft and vandalism of his materials and equipment stored on the site in trailers, buildings, etc., which are not yet a permanent part of the work.

ADD THE FOLLOWING CLAUSES:

- 11.3.1.6 The Owner shall insure himself against claims for theft and vandalism of all materials and equipment which have been installed and have become a permanent part of the work.
- 11.3.1.7 If by the terms of this insurance any mandatory deductibles are required, or if the Owner should elect to increase the mandatory deductible amounts or purchase this insurance with voluntary deductible amounts, the owner shall be responsible for the payment of the amount of deductible in the event of a paid claim.
- 11.3.2 REVISE THE FIRST SENTENCE TO READ AS FOLLOWS: ...The Contractor shall purchase and maintain steam boiler and machinery insurance as may be required by the contract documents or by law through testing and final acceptance by the Owner.
- 11.3.3 DELETE REMAINDER OF PARAGRAPH AFTER FIRST SENTENCE.
- 11.3.4 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY; CHANGE TO READ AS FOLLOWS: ...If the Contractor requests in writing that insurance for special hazards be included in the property insurance policy, the Owner shall, if possible, include such insurance and the cost thereof shall be charged to the Contractor by appropriate Change Order.

11.3.7 CHANGE THE FIRST SENTENCE TO READ AS FOLLOWS: ...The Owner and Contractor waive all rights against (1) each other and the Subcontractors, Sub-subcontractors, agents and employees each of the other, and (2) the Architect, his consultants, the Construction Manager and separate Contractors, if any, and any of their subcontractors, Sub-subcontractors, agents and employees, for damages...

ADD THE FOLLOWING SENTENCE: The policies shall not prohibit waivers of subrogation.

- 11.3.10 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY AND SUBSTITUTE THE FOLLOWING: The Owner, as Trustee, shall have power to adjust and settle any loss with the insurers.
- 11.3.11 ADD THE FOLLOWING: ...This coverage shall not be terminated until final payment to the Contractor or occupancy. The insurance company and/or Owner shall give ten (10) days written notice to the Construction Manager/GC, Architect, and Contractors prior to termination of policies provided under the provisions of Property Insurance.

11.4 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

DELETE PARAGRAPH 11.4.1 IN ITS ENTIRETY AND INSERT THE FOLLOWING:

11.4.1 "The Contractor shall provide a Performance Bond and labor and Material Payment Bond, each in an amount equal to one hundred ten percent (110%) of the Contract Sum and drawn in favor of the Owner."

ADD SUBPARAGRAPHS 11.4.3 AND 11.4.4 AS FOLLOWS:

- 11.4.3 "Performance Bond and Labor and Material Payment Bond shall be executed by a surety acceptable to the Owner on the edition of AIA Documents A311/A312 current as of the date of the award of the Contract."
- 11.4.4 "The Contractor shall use as a Surety for the applicable bond one of the acceptable companies determined strictly in accordance with the following: Insurance and Surety companies shall be deemed qualified and acceptable to the Owner's Legal Counsel, in connection with Contractor bonding and insurance requirements under said Contracts only if such companies have a Policy Holders Rating of "A", a financial category not less than Class VI and Policy Holder Surplus of not less than \$25,000,000.00 all as shown on "Best's Key Rating Guide", latest edition, provided, however, that the bond furnished is furnished by one of the aforesaid qualified Sureties who is also listed in the Department of the Treasury Circular 570 Volume 41 No. 132, Part V (Federal Register) and is licensed in the State of Indiana and the penal sum of the bond does not extend the underwriting limitation set forth in the subject Circular, unless the excess, if any, is reinsured with the approval of the Owner.

11.4.5 ADD THE FOLLOWING SUBPARAGRAPH: The Contractor shall deliver the required bonds to the Owner prior to the date of execution of the contract and fourteen (14) days prior to the date set for bond closing. The Owner, Architect, or Construction Manager/GC shall not be responsible for any costs associated with securing the bond should the project be canceled prior to contracts being fully executed.

11.4.4.1 a. Said bonds shall remain in full force and effect during the life of this contract and for a period of at least 12 months after the date of final completion of the contract. Should the Contractor's bonding company give notice of cancellation, the Contractor will be responsible for securing a new bond within fourteen (14) calendar days.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

ADD TO 12.2.4 THE FOLLOWING:

If any Subcontractor chooses to use any system, equipment, facilities, or services which have been installed into the building as a permanent part thereof by any other Contractor, said Contractor shall assume full responsibility for damage to said system, equipment, facilities, or services and shall make such arrangements with the installing subcontractor as are necessary, so that in no case the performance for the period mentioned above shall be jeopardized as a result of such use; and said use can be implemented only after written approval is given by the Architect/Construction Manager.

ARTICLE 13 MISCELLANEOUS PROVISIONS

- 13.4 RIGHTS AND REMEDIES
- 13.5 TESTS AND INSPECTIONS

13.5.5 AMEND SUBPARAGRAPH TO READ:

All equipment shall be inspected and tested under operating conditions. The Architect, CM/GC, and/or Owner reserve the right to be present at said testing. Contractor shall give the Architect, CM/GC, and Owner at least thirty-six (36) hours advance notice by telephone prior to scheduling said tests and operations. If inspection or tests show defects, they shall be corrected and inspections and tests repeated until proven satisfactory. Neither the observations of the Architect or CM in administration of the Contract, nor inspections, tests or approvals persons other than the Contractor, shall relieve the Contractor from obligations to perform the Work in accordance with the Contract Documents.

ARTICLE 14 TERMINATION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

- 14.1.2 Put a period after "...Contract" and delete "and recover from the Owner payment for all Work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages."
- 14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 ADD THE FOLLOWING: In the event the Owner so terminates the contract, the Owner shall be entitled to a distribution of the escrowed principal and escrowed income pursuant to the terms of the escrow agreement.

14.2.4 In the first sentence, insert the following phrase between the words "Work" and "including" "including the escrowed principal and escrowed income paid to the Owner pursuant to subparagraph 14.2.1 and."

14.2.5 ADD THE FOLLOWING SUBPARAGRAPH: The Owner shall have the right at any time to terminate the contract if such termination is in the public interest. In such case, the Owner's liability to the Contractor will be limited to payment of work completed, and reasonable charges for return and restocking of materials purchased, but not incorporated into the work.

ARTICLE 15 PERMANENT UTILITIES

15.1 PERMANENT UTILITIES

15.1.1 The Contractor shall make arrangements with utility companies for permanent utilities such as telephone, gas, electrical, water, and sewer. The Contractor shall verify exact requirements of the utility with regard to such service and include in the bid all cost related to same such as meter pits, meter arrangement, pipe, conduit, fittings, valves, specialties, service, and tap fees, etc.

ARTICLE 16 LIENS

- 16.1 NO LIEN CONTRACTS
- 16.1.1 "Owner and all Contractors shall agree that no lien shall attach to the real estate by Contractor, Subcontractor, mechanics, journeymen, laborers or persons performing labor upon or furnishing materials or machinery for the Work provided for under terms of this Contract, and for the purpose of complying with provisions of I.C. 32-8-3-1, Chapter 116 of the Acts of Indiana General Assembly for the year 1090, Chapter 41 of said Acts 1911, Chapter 50 of said Acts 1915, Chapter 56 of said Acts of 1921, Chapter 187 of said Acts of 1943, Chapter 376 of said Acts of 1963, Section I, P.L. 424 of said Acts of 1971, the parties agree that this Contract shall be recorded with the Recorder of the county in which the Project is located within five days after its execution.

01 11 01 - SUMMARY OF WORK

A. GENERAL

- 1. SCOPE
 - a. The Project consists of the total construction and complete finishing of a twentytwo (22) unit, two-story, 19,344 square feet +/- permanent supportive housing project located at Hope Avenue, South Bend, Indiana, all to be as shown on the plans and/or herein specified. The requirements set forth in Division <u>I GENERAL</u> <u>REQUIREMENTS</u> shall apply to all contractors and/or subcontractors.
 - b. Refer to Section <u>00 24 00 PROCUREMENT SCOPE</u> for description of the following Bid Packages:

BID PACKAGES 1-29

- c. Throughout the body of the specifications, the terms "Construction Manager", "General Contractor", "Contractor" and "Subcontractor" are used and these terms shall indicate general and specific areas of responsibility. No "requests for extra" will be entertained from any Contractor which arise out of interpretation of this language. Requirements and/or instructions will apply equally to all Contractors and Subcontractors. Contractors and Subcontractors are bound to the General Contractors in the same manner as the General Contractor is bound to the Owner.
- d. Products not mentioned but which meet these specifications <u>may</u> be incorporated in the work provided they are <u>previously approved</u> by the Architect.

2. FIELD MEASUREMENTS

a. The Contractor shall obtain his own lines and/or grades and shall assume all responsibility for the accuracy of same. He shall reconcile all measurements and conditions on the site of proposed work.

3. CORRELATION, INTENT AND INTERPRETATION

- a. The specifications, drawings and directions furnished by the Architect are intended to cooperate and agree. The drawings and specifications shall be interpreted by the Architect according to spirit and intent of same, without any extra charge whatsoever. If any discrepancies or variations appear between any of the drawings or specifications, such discrepancies shall be interpreted by the Architect who shall have the right to correct any errors and omissions in them as are necessary for proper fulfillment of their intention.
- b. Anything shown on the plans and not mentioned in the specifications or vice versa must be furnished by the Contractor without extra compensation. Furthermore, if any material or work is required which is absolutely necessary to carry out the full meaning and intent of the plans and specifications, the Contractor hereby agrees to consider and allow for the same as fully as if they are so noted and to perform the work without extra charge or claim for extra compensation.

- c. At several locations in the Specifications, manufacturers have been specifically mentioned as acceptable producers of certain products. The omission of any manufacturer is not intended to stipulate that products of that manufacturer may not be used in the work. Products and manufacturers not specifically mentioned will be considered and will be reviewed by the Architect for acceptability providing the Bidder stipulates his intention with his bid.
- d. Base bids are to be submitted using only products and manufacturers specifically mentioned in the Specifications or approved by Architect and confirmed via written Addendum. If any Bidder wishes to use other equal products, those products must be mentioned in the bid via proposed voluntary alternates.
- e. No dimensions are to be presumed by the Contractor, nor are the drawings to be scaled on the job. If there appears to be a variation between the written dimension and the scale of the drawings, the written dimension will govern in all cases.
- 4. EQUIPMENT, FINAL CONNECTIONS, ETC.
 - a. Unless otherwise shown and/or selected, all special furnishings and/or equipment will be furnished and installed by the equipment contractor. Each equipment vendor shall furnish all switches, outlet boxes, trim, safety devices, tail pieces, etc., unless specifically noted otherwise. Unless otherwise noted, the Contractor will bring services to indicated locations and make final connections to all equipment and this will include labor and material from the rough-in location to tail pieces, outlet boxes, etc.
- 5. ANCHOR BOLTS, SLEEVES, ETC.
 - a. Where any apparatus to be installed requires anchor bolts, these shall be furnished and set to template by the respective Contractors whose apparatus requires same.
 - b. Where conduit pass through walls, floors or roof, sleeves consisting of sheet metal or steel pipe 1" larger than the required opening and extending flush with finished face shall be set by the Contractor requiring their use. Same Contractor to seal sleeve as required by any and all local or state codes.

6. SUBSTITUTIONS

- a. The Contract is based on the materials, equipment and methods described in the Contract Documents. The Owner/Architect will consider proposals for substitutions for materials, equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Owner/Architect to evaluate the proposed substitutions.
- b. Do not substitute materials or methods, unless such substitution has been specifically approved for this work by the Owner/Architect <u>in writing</u>. Such requests for submittals and substitutions must be submitted in time for Owner/Architect to evaluate, minimum ten (10) working days prior to bid due date.
- 7. AVAILABILITY OF SPECIFIED ITEMS

- a. Verify prior to bidding that all specified items will be available in the timetable assigned for the installation during orderly and timely progress of the work.
- b. In the event specified item or items will not be available, so notify the Owner prior to receipt of bids. This is especially true when unavailability of specified items will cause delays.

8. SEPARATE SUBSTITUTE BIDS

a. If desired, bidders may submit completely separate bids using materials and methods other than those described in these Contract Documents, provided that all substitutions are clearly identified and described and that the bid is in all other respects in accordance with the provisions of the Contract Documents.

9. TIMING OF SUBMITTALS

- a. Make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approvals, for possible revision and resubmittals and for placing orders and securing delivery.
- b. In scheduling, allow at least fifteen (15) full working days for the Architect's review following his receipt of the submittal.

10. SHOP DRAWINGS

a. Provide one (1) hard copy and one (1) electronic copy (PDF) of complete sets of shop drawings for all materials requiring same.

11. COLORS

- a. All colors (including prefinished materials) will be as selected by Owner/Architect. A schedule will be provided. Submit accurate color charts and pattern charts to the Owner/Architect for their review and selection.
- 12. "OR EQUAL"
 - a. Where phrase "or equal", or "or equal as approved by the Owner/Architect" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Owner/Architect unless the item has been approved for <u>this</u> work by the Owner/Architect.

13. WARRANTIES AND GUARANTEES

a. The Contractor shall guarantee the quality of construction for a period of **one (1) year** against defects in workmanship and materials. The Contractor will, at his own expense, make any and all repairs that may be necessary as a result of defects in workmanship and/or materials supplied by the Contractor. The guarantee period shall begin on the date of substantial completion of the project as identified on "Statement of Substantial Completion - Request for Inspection", latest edition. The Contractor's guarantee for construction shall be submitted to the Owner on the Contractor's company letterhead in the form prescribed.

14. OPERATION/MAINTENANCE MANUALS

a. The Contractor shall furnish one (1) complete hard copy and one (1) electronic of operation/maintenance manuals for Owner's use. Each subcontractor shall cooperate with the General Contractor and provide full information (including complete cut sheets) of all equipment, fixtures, etc., included within their scope of work.

15. RECORD DOCUMENTS

a. At the completion of the project, the General Contractor shall submit a set of prints on which have been marked in red (pencil or permanent marker) all changes made during construction which deviate from the original contract documents. Each subcontractor shall cooperate with the General Contractor and provide full information concerning deviations included within the scope of their own work.

16. ROOM MOCKUPS

- a. All contractors and subcontractors are advised that Rooms 100 and 101 will be built as mockup rooms for the purpose of coordinating locations of all trades, systems, devices, etc. Room 100 will be completed and maintained in the roughin stage until rough-in is complete in all other project areas. Room 101 will be completed and maintained in a finished state including all fixture, equipment and device installations.
- b. In addition to reconciling potential conflicts, these mockup rooms will be reviewed by the Owner and Architect to establish the level of quality to be met throughout the building. These rooms shall be completed prior to the start of rough-in work at any other location.

01 23 00 - ALTERNATES/VOLUNTARY ALTERNATES

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division <u>1 GENERAL REQUIRMENTS</u> apply to this Section.

2. SUMMARY

a. This Section specifies administrative and procedural requirements for Alternates.

3. DEFINITIONS

a. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.

4. COORDINATION

a. Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.

5. NOTIFICATION

- a. Immediately following the award of the Contract, Construction Manager will prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- b. Include as part of each alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- B. PRODUCTS (Not Applicable)
- C. EXECUTION
 - 1. REQUIRED ALTERNATES
 - a. The Contractor shall state the amount that shall be <u>added to</u> or <u>deducted from</u> the Contractor's Base Bid for the following alternate work:
 - 1) <u>Alternate No. 1</u>:

Provide price to substitute vinyl clapboard siding in place of adhered stone masonry throughout.

2) <u>Alternate No. 2</u>:

3)

Provide price to substitute fiber-cement siding (clapboard, board and batten, shakes and trim) in place of vinyl siding and trim throughout.

- <u>Alternate No. 3</u>: Delete the entire irrigation system, outside the building as shown on Sheet <u>L2.0 IRRIGATION PLAN</u> and Specification Section <u>32 80 00 IRRIGATION</u> shall be an Alternate. Refer to <u>UTILITY PLAN SHEET C1.1; DETAIL-1.</u>
- 4) <u>Alternate No. 4</u>: Construct new 5' wide concrete sidewalk along Hope Avenue. Set edge of walk 6" south of property line. Sidewalk shall be constructed in accordance with the City of South Bend standard specifications.
- b. Bids for required alternates described herein are required in order for the Owner to obtain information necessary for the proper consideration of the project in its entirety. Each bidder shall submit their bid under each Alternate for all work outlined in Section <u>01 11 01 SUMMARY OF WORK</u> for the bid package contract being bid. All bidders shall indicate for each Alternate listed the appropriate Add or Deduct, No Change (N/C), or Not Applicable (N/A). No indication will be considered as "No Change."
- 2. VOLUNTARY ALTERNATES (Bidder's Choice, Selection, or Option)
 - a. Fully describe all proposed substitutions, changes, or alternates of each type and description. Sufficient technical material must accompany voluntary alternates for them to be considered. Use the form attached to the Bid Form to provide the technical detail necessary.
 - b. Voluntary alternates are solicited for all products and services which cannot be obtained in time to meet the project schedule.

Project Name:	 Voluntary Alt. #	
Project Name:	Date:	

- 1. Item Description
- 2. Related Information (Drawing and Specification Numbers):
- 3. Reason for Change
 - Conflict with other requirements
 - Change in codes/regulation or new interpretation
 - Clarification of documents
 - Changes in specified products or materials
 - _____ Availability Pricing
 - Compatibility with other required products
 - _____ New information or product standards
 - Improvement to result from the new requirement:
 - Expedite construction
 - _____Lower cost
 - _____ Improved coordination with other work
 - _____ Greater fidelity to the original design intent
 - _____ Improved design quality
4. Proposed Change Complies with Codes and Regulations

_____ Fire

_____ Safety _____ Related regulatory agencies

Government client regulations

- 5. Proposed substituted material, product, equipment, fixture, finish, construction standard, or system is genuinely equal or superior to the original requirement:
 - _____ Comparable quality is validated by:
 - (Attached support information)
 - Grade association standard
 - _____ Testing laboratory
 - Substantial and enforceable warranty
 - Reputation and longevity of manufacturer or supplier
 - _____ Designer's experience
 - Client's experience
 - Examination of samples
 - Examination of existing construction
- 6. Additional documentation required: (Attachments as necessary)

APPROVED:

01 25 13 - PRODUCT SUBSTITUTION PROCEDURES

A. GENERAL

- 1. REQUIREMENTS
 - a. Contractor is advised that the proposal and subsequent Contract for Construction are based on the products materials, equipment and methods described in the Contract Documents. The Architect and the Owner will consider proposals for substitutions for a limited period of ten (10) <u>working days</u> after the Notice to Proceed provided that such proposals are submitted in accordance with stipulations outlined herein.
 - 1) Proposals for substitutions will be considered <u>only</u> if said proposals increase the quality of the project, decrease the expenditure on the part of the Owner or are clearly superior to the products, materials, equipment, and methods specified herein.
 - 2) Proposals for substitutions which appear to be submitted only to decrease the expenditures on the part of the Contractor without a corresponding proposal for a reduction in the contract amount will not be entertained.
 - 3) No substitutions will be accepted after the initial period for submittals of such substitutions.
 - 4) If a substitution is proposed resulting from availability problems with specified materials, proposals should also include consideration for modifications to the contract amount on behalf of the Owner.
 - 5) No request for an extension of the time of completion will be entertained by the Architect or the Owner if such an extension is a result of the Contractor's lack of knowledge of the availability of the specified items.
 - 6) As a minimum, in order to be considered, all substitution requests shall address the following issues:
 - a) List the specified product which is to be substituted.
 - b) Provide complete manufacturer's product information for both the originally specified product as well as the proposed substitution product.
 - c) If the product is equal or superior to that specified, explain in detail the advantages as well as any disadvantages.
 - d) List the credit proposed to the Owner for acceptance of the substitution.
 - e) Substitution request shall be made using the Substitution Request Form.

SUBSTITUTION REQUEST FORM

To:					
Proje	ct:				
We h proje	ereby submit for yo ct:	ur consideration the followir	ng product instead of the	specified item for the above	
	Section	Paragraph	Originally Sp	pecified Item	
	Attach complete applicable.	e technical data for the or	ginally specified item, i	including laboratory tests if	
Propo	osed Substitution:				
Attacl applic	h complete technic cable.	cal data for the proposed	substitution product, i	ncluding laboratory tests if	
Subrr subst	nit complete informative informative interview of the second second second second second second second second s	ation, including changes to proper installation.	drawings and/or specifi	cations which the proposed	
Fill in	blanks below; use	additional sheets if necessa	ry:		
A. Is the substitution product equal or superior to the product originally s				specified?	
	Yes? In what way(s)? Explain advantages/disadvantages.				
В.	What is the prop	What is the proposed reduction in Contract Amount? \$			
C.	Is the specified product no longer available?				
The i equiv	undersigned states alent or superior to	that the function, appea the specified item.	rance and quality of th	ne substitution product are	
Submitted By:		For Use by Design Consultant:			
Signature			 Accepted Not Accepted 	 Accepted as Noted Received Too Late 	
Firm:					
Addre	ess:				
Rema	arks:				
Telep	hone:				

01 26 00 - CONTRACT MODIFICATION PROCEDURES

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division <u>1 GENERAL REQUIREMENTS</u>, apply to this section.
 - b. Section <u>01 33 01 SUBMITTALS</u> for requirement for the Contractor's Construction Schedule.
 - c. Section <u>01 25 00 PRODUCT SUBSTITUTION PROCEDURES</u> for administrative procedures for handling request for substitutions made after award of the Contract.
- 2. SUMMARY
 - a. This section specifies administrative and procedural requirements for handling and processing Contract modifications.
- 3. MINOR CHANGES IN THE WORK

2)

- a. Supplemental instructions authorizing minor changes in the work, not involving an adjustment to the Contract Sum or Contract Time, will be issued in writing by the Construction Manager after review by the Architect.
- 4. CHANGE ORDER PROPOSAL REQUESTS
 - a. <u>Owner-Initiated Proposal Requests:</u>
 - Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Construction Manager, after review by the Architect, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
 - Proposal requests issued by the Architect are for information only.
 - a) Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
 - 3) Unless otherwise indicated in the proposal request, within seven (7) days of receipt of the proposal request, submit to the Construction Manager for the Owner's and Architect's review an estimate of cost necessary to execute the proposed change.
 - 4) Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - 5) Indicate applicable taxes, delivery charge, equipment rental, and amounts of trade discounts.
 - 6) Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
 - b. <u>Contractor-Initiated Change Order Proposal Requests:</u>

- 1) When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Construction Manager.
- 2) Include a statement outlining the reasons for the change and the effect of the change on the Work.
- 3) Provide a complete description of the proposed change.
- 4) Indicate the effect of the proposed change on the Contract Sum and Contract Time.
- 5) Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made.
- 6) Where requested, furnish survey data to substantiate quantities.
- 7) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
- Comply with requirements in Section <u>01 25 13 PRODUCT SUBSTITUTION</u> <u>PROCEDURES</u> if the proposed change in the Work requires the substitution of one product or system for a product or system specified.
- c. <u>Proposal Request Form:</u> Use AIA Document G701/CM for Change Order Proposal Requests.
- d. <u>Allowances</u>:
 - 1) <u>Allowance Adjustment:</u>
 - a) Base each Change Order Proposal Request for an allowance cost adjustment solely on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerance, mixing wastes, normal product imperfections, and similar margins.
 - b) Include installation costs in the purchase amount only where indicated as part of the allowance.
 - c) When requested, prepare explanations and documentation to substantiate the margins claimed.
 - d) Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit, within seven (7) days of receipt of the change order or construction change directive authorizing work to proceed.
 - e) Claims submitted later than seven (7) days will be rejected.
- e. The Change order cost amount shall not include the Contractor's or Subcontractor's indirect expense except when it is clearly demonstrated that either the nature or scope of work required was changed from that which could have been foreseen from the description of the allowance and other information in Contract Documents.
- f. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.
- g. <u>Change Order Procedures:</u>
 - 1) Upon the Owner's approval of a Change Order Proposal Request, the Construction Manager will issue a Change Order for signatures of the

Owner and Contractor on ASA Form G701, as provided in the Conditions of the Contract.

- B. PRODUCTS (Not Applicable)
- C. EXECUTION (Not Applicable)

01 31 13 - PROJECT COORDINATION

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Conditions of the Contract.
 - b. Section <u>01 11 01 SUMMARY OF WORK.</u>
 - 2. SUMMARY
 - a. This Section specifies administrative and supervisory requirements which are necessary for project coordination, including but not necessarily limited to:
 - 1) Coordination Requirements.
 - 2) Supervisory Personnel.
 - 3) Limitations for Use of Site.
 - 4) General Installation Provisions.
 - b. These requirements must be participated in by each prime contractor, where applicable, even though certain items of work may be assigned to a specific prime contractor, and even though the contractor for general work may be assigned certain general work for overall coordination purposes.

3. COORDINATION REQUIREMENTS

- a. The Construction Manager will manage construction of the project.
- b. Each Contractor shall schedule, manage, and expedite all work under his contract, coordinating his work with all other contractors and trades so that no conflicts of timing or location occur.
- c. The work shall progress according to the approved and current construction progress schedule.
- d. Each Contractor shall:
 - 1) Assume full responsibility for protection and safekeeping of products stored on premises.
 - 2) Move any stored products which interfere with operations of Owner or other contractors.
 - 3) Furnish, erect, and maintain barricades, warning lights, signs and guards as may be required for his work.
 - 4) Notify, in writing, the Construction Manager and Owner at least forty-eight
 (48) hours in advance of utility connections or shutoff.
 - a) Coordinate these operations with the Owner, through the Construction Manager, and complete the Work in the minimum amount of time.
 - 5) Prepare coordination drawings where work by separate entities requires fabrication off-site of projects and materials which must accurately interface.
 - a) Coordination drawings shall indicate how work shown by separate shop drawings will interface and shall indicate installation sequence.
 - b) Where coordination drawings cover primarily the work of one prime contract, with only minor amounts of work by other prime

contractors included, the prime contractor with the major amount of work shall prepare coordination drawings, as designated by the Architect.

- c) Where coordination drawings cover substantial amounts of work by more than one prime contractor, including the Contractor for General Work, the Contractor for General Work shall prepare coordination drawings, as designated by the Architect.
- d) Where coordination drawings cover substantial amounts of work of more than one prime contract, but do not include a substantial amount of work under the Contract for General Work, then the Construction Manager will designate the prime contractor responsible for a major part of the work as responsible for preparation of coordination drawings.
- d. <u>Adjustments</u>:
 - 1) The Architect reserves the right to make minor adjustments (maximum of 10'0") in location of piping, outlets, and/or equipment at no additional charge if so directed prior to their installation.
- 4. SUPERVISORY PERSONNEL
 - a. Each Prime Contractor must designate a superintendent who shall represent the Contractor on the job site.
 - 1) Directions given to the superintendent shall be as binding as if given to the Contractor.
 - b. Once a superintendent is assigned to the project, he or she cannot be removed or replaced without consulting the Construction Manager.
 - c. The prime contractor and/or superintendent shall:
 - 1) Staff, schedule, and supervise the work to meet the construction schedule.
 - 2) Purchase and schedule delivery of materials and sublet subcontracts to meet the construction schedule.
 - 3) Inspect the work of other contractors which precedes your work and upon which your work depends.
 - a) Report to the Construction Manager any deviations from the Contract Documents.
 - b) Commencement of work on substrate constitutes acceptance of the other contractor's work.
 - 4) Cooperate with other prime contractors doing work on this project.
 - 5) Notify the Construction Manager of conditions that could delay the Work.
 - 6) Furnish the Construction Manager with a daily manpower report and description of work completed as requested.
 - 7) Attend progress meetings as scheduled by Construction Manager to review coordination of various phases of work.
 - a) The Contractor shall be represented by persons with full authority to act on matters pertaining to the Work.
- 5. LIMITATIONS FOR USE OF SITE
 - a. <u>General</u>:
 - 1) Limitations on site usage as well as specific requirements that impact utilization are indicated on the drawings and by other Contract Documents.

- a) In addition to these limitations and requirements, the Construction Manager shall administer allocation of available space equitably among the separate prime contractors and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project.
- b) Each prime contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.
- b. Confine operations at site to areas permitted by Law, Ordinances, Permits, and the Contract Documents.
- c. Reference site plans showing general boundaries for new construction phase and demolition/sitework phase.
- 6. PRE-INSTALLATION CONFERENCES
 - a. Where the contract documents require a pre-installation conference before work of that area is to begin, the Contractor shall make arrangements for the required conference, and notify the Construction Manager, Architect and other listed parties, **IN WRITING**, at least two (2) weeks prior to the meeting.
 - b. The Contractor is responsible to ensure that any subcontractor, suppliers, or manufacturer's representatives required to be in attendance are present at the meeting.
 - c. All pre-installation conferences will be scheduled to occur on-site during normal working hours.
 - d. The Contractor shall keep minutes of the meeting, and distribute them to all parties in attendance, or required to attend.

7. GENERAL INSTALLATION PROVISIONS

- a. <u>Inspection of Conditions</u>:
 - 1) Require the installer of each major component to inspect both the substrate and conditions under which Work is to be performed.
 - 2) Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- b. <u>Manufacturer's Instructions</u>:
 - 1) Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
 - 2) Inspect materials or equipment immediately upon delivery and again prior to installation.
 - a) Reject damaged and defective items.
 - 3) Provide attachment and connection devices and methods necessary for securing Work.
 - a) Secure Work true to line and level.
 - b) Allow for expansion and building movement.
- c. <u>Visual Effects</u>:
 - 1) Provide uniform joint widths in exposed work.

- 2) If not otherwise specified in the drawings, arrange joints in exposed work to obtain the best visual effect.
- 3) Refer questionable choices to the Architect for final decision.
- 4) Re-check measurements and dimensions before starting each installation.
- 5) Install each component during weather conditions and Project status that will ensure the best possible results.
- 6) Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- Coordinate temporary enclosures with required inspections and tests, to minimize necessity of uncovering completed construction for that purpose.
- d. Mounting Heights:
 - 1) Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated.
 - a) Refer questionable mounting height decisions to the Architect for final decision.
- e. During handling and installation, clean and protect construction in progress and adjoining materials in place.
 - a) Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- 8. CHASES
 - a. Unless otherwise specified or indicated, all items such as piping, ductwork and conduit shall be concealed in walls or chases.
 - 1) Cutting or chasing required after walls are in place shall be performed by the proper trades or crafts at the expense of the trade or craft requiring the cutting or chasing.
- 9. TEST
 - a. Where the contract documents require any work to be tested, the Architect and Construction Manager shall be notified sufficiently in advance so that he may observe such tests.
- 10. COMMUNICATION PROCEDURE
 - a. All correspondence must go through the Construction Manager.
 - b. Contract Document clarification must be submitted to the Construction Manager so an Information Request Form can be filled out and forwarded to the Architect/Engineer.

01 31 19 - PROJECT MEETINGS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. General provision of the Contract, including General and Supplementary Conditions and other Division 0 and Division <u>1 GENERAL REQUIREMENTS</u> specifications, apply to this Section.

2. SUMMARY

- a. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1) Pre-Construction Conference
 - 2) Pre-Installation Conferences
 - 3) Coordination Meetings
 - 4) Progress Meetings

3. PRE-CONSTRUCTION CONFERENCE

- a. The Architect and Construction Manager will schedule a pre-construction conference and organizational meeting at the Project site or other convenient location.
 - 1) The meeting will be conducted to review responsibilities and personnel assignments.
- b. <u>Attendees:</u> The Owner, Architect, Construction Manager, and their consultants, each Prime Contractor and their superintendent, and major subcontractors shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- c. <u>Agenda:</u> Discuss items of significance which could affect progress including such topics as:
 - 1) Tentative Construction Schedule
 - 2) Critical Work Sequencing
 - 3) Designation of Responsible Personnel
 - 4) Procedures for Processing Field Decisions and Change Orders
 - 5) Procedures for Processing Applications for Payment
 - 6) Distribution of Contract Documents
 - 7) Submittal of Shop Drawings, Product Data, and Samples
 - 8) Preparation of Record Documents
 - 9) Use of the Premises
 - 10) Office, Work, and Storage areas
 - 11) Equipment Deliveries and Priorities
 - 12) Safety Procedures
 - 13) First Aid
 - 14) Security
 - 15) Housekeeping
 - 16) Working Hours
 - 17) Owner Requirements
 - 18) Temporary Facilities and Controls
- 4. PRE-INSTALLATION CONFERENCES

- a. Conduct a pre-installation conference at the site before each construction activity which requires coordination with other construction.
 - 1) The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations which have preceded or will follow, shall attend the meeting.
 - 2) Advise the Architect and Construction manager of scheduled meeting dates, preferably after regularly scheduled progress meetings.
- b. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - 1) Contract Documents
 - 2) Options
 - 3) Related Change Orders
 - 4) Purchases
 - 5) Deliveries
 - 6) Shop Drawings, Product Data, and Quality Control Samples
 - 7) Possible Conflicts
 - 8) Compatibility Problems
 - 9) Time Schedules
 - 10) Weather Limitations
 - 11) Manufacturer's Recommendations
 - 12) Compatibility of Materials
 - 13) Acceptability of Substrates
 - 14) Temporary Facilities
 - 15) Space and Access Limitations
 - 16) Governing Regulations
 - 17) Safety
 - 18) Inspection and Testing Requirements
 - 19) Required Performance Results
 - 20) Recording Requirements
 - 21) Protection
- c. Each respective contractor will record significant discussions and agreements and disagreements of each conference, along with the approved schedule.
 - 1) Construction Manager will distribute the record of the meeting to everyone concerned, promptly, including the Owner and Architect.
- d. Do not proceed if the conference cannot be successfully concluded.
 - 1) Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

5. COORDINATION MEETINGS

- a. Conduct Project coordination meetings at regularly scheduled times as scheduled by Construction Manager.
 - 1) Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special preinstallation meetings.
- b. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

6. PROGRESS MEETINGS

- a. The Construction Manager will designate a specific hour and day, occurring on a bi-weekly basis for the first six (6) months of this project, weekly or more often as required afterwards, to conduct project meetings on the job for the purpose of discussion of problems, interpretations, and progress of the work.
- b. <u>Attendees:</u> In addition to representatives of the Owner, Architect (as necessary), and Construction Manager, each Contractor, subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities, shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
 - 1) Attendance at progress meetings will be mandatory.
 - a) Failure to attend shall result in a \$100.00 fine per meeting that will be deducted from the following pay application.
- c. <u>Agenda:</u>
 - 1) Review and correct or approve minutes of the previous progress meeting.
 - 2) Review other items of significance that could affect progress.
 - 3) Include topics for discussion as appropriate to the current status of the Project.
- d. <u>Contractor's Construction Schedule:</u>
 - 1) Contractors shall review progress since the last meeting.
 - 2) Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule.
 - a) Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so.
 - b) Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- e. Review the present and future needs to each entity present, including such items
 - as:
 - 1) Interface Requirements
 - 2) Time
 - 3) Sequences
 - 4) Deliveries
 - 5) Off-Site Fabrication Problems
 - 6) Access
 - 7) Site Utilization
 - 8) Temporary Facilities and Services
 - 9) Hours of Risks
 - 10) Hazards and risks
 - 11) Housekeeping
 - 12) Quality and Work Standards
 - 13) Change Orders
 - 14) Documentation of Information for Payment Requests
- f. <u>Reporting:</u> Copies of meeting minutes will be distributed to each party present and to other parties who should have been present.
- g. <u>Schedule Updating:</u>

- 1) Construction Manager shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized.
 - a) He shall issue the revised schedule to all concerned including Owner, Construction Manager, Architect, and Architect's consultants.

01 33 01 - SUBMITTALS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
 - 1) Submittal Schedule.
 - 2) Construction Schedule.
 - 3) Daily Construction Reports.
 - 4) Samples.

2. SUBMITTAL PROCEDURES

- a. <u>Coordination</u>: Submit one (1) hard copy and one (1) electronic copy (PDF) of all shop drawings and three (3) copies of all brochures, color data, samples, test data and manufacturer's instructions and specifications, as required by the Contract Documents, for approval within thirty (30) days of award of the Contract. In no case shall any materials or equipment be delivered to the job site until submittals have been reviewed by the Architect/Engineer. This requirement will be a condition for approval of subsequent Application for Payment.
 - 1) Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities which require sequential activity.
 - Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - 3) The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- b. <u>Submittal Preparation</u>: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity which prepared each submittal on the label or title block.
 - 1) Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 - 2) Include the following information on the label for processing and recording action taken.
 - a) Project Name
 - b) Date
 - c) Name and Address of Architect and Construction Manager
 - d) Name and Address of Contractor
 - e) Name and Address of Subcontractor (if applicable)
 - f) Name and Address of Supplier
 - g) Name of Manufacturer
 - h) Number and Title of Appropriate Specification Section
 - i) Drawing Number and Detail References, as Appropriate
- c. <u>Submittal Transmittal</u>: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Prime Contractor to Construction Manager's main office using a transmittal form. Submittals received from sources other than the Prime Contractor will be returned without action.

1) On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

3. CONSTRUCTION SCHEDULE

- a. <u>Bar-Chart Schedule</u>: Each Prime Contractor shall prepare a fully developed, horizontal bar-chart-type Contractor's construction schedule based on Construction Schedule prepared by Construction Manager. Submit within fourteen (14) days of the date of Contract to the Construction Manager.
 - Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."
 - Within each time bar indicate estimated completion percentage in ten (10%) percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 - 3) Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 - 4) Secure time commitments for performing critical elements from the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
 - 5) Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
 - 6) Each Prime Contractor shall be responsible for enforcing and maintaining their work as scheduled at all times.
 - 7) If, in the opinion of the Owner, Architect, Construction Manager, the execution of the work falls behind the progress schedule, the Prime Contractor shall take such steps as may be necessary to improve the progress of the work, including but not limited to overtime, increase the size the number of crews, work multiple shifts, or take other measures as directed by the Owner, Construction Manager, and shall submit for review a revised schedule to demonstrate the manner in which progress will be regained, all without additional cost to the Owner, Architect, or Construction Manager.
- b. <u>Phasing</u>: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.
- c. <u>Work Stages</u>: Indicate important stages of construction for each major portion of the Work, including testing and installation.
- 4. SUBMITTAL SCHEDULE

- a. Each Prime Contractor shall prepare a complete schedule of submittals. Submit the schedule within ten (10) days of the date of contract to the Construction Manager.
- b. Prepare the schedule in chronological order. Provide the following information:
 - 1) Scheduled date for the first submittal.
 - 2) Related Section Number.
 - 3) Submittal category.
 - 4) Name of subcontractor (if applicable).
 - 5) Description of the part of the Work covered.
 - 6) Scheduled date for resubmittal.
 - 7) Scheduled date for Architect's final release or approval.
- c. <u>Distribution</u>:
 - 1) Following response to initial submittal, print and distribute copies to the Architect, Construction Manager, subcontractors, and other parties required to comply with submittal dates indicate.
 - 2) Post copies in the Project meeting room and field office.
 - 3) When revisions are made, distribute to the same parties and post in the same locations.
 - 4) Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

5. DAILY CONSTRUCTION REPORTS

- a. Each Prime Contractor while working on the project site shall prepare a daily construction report, recording the following information concerning events at the site; and provide a copy for the Construction Manager's file:
 - 1) List of subcontractors at the site.
 - 2) Count of personnel at the site.
 - 3) High and low temperatures, general weather conditions.
 - 4) Accidents and unusual events.
 - 5) Meetings and significant decisions.
 - 6) Stoppages, delays, shortages, losses.
 - 7) Meter readings and similar recordings.
 - 8) Emergency procedures.
 - 9) Orders and requests of governing authorities.
 - 10) Change Orders received/implemented.
 - 11) Services connected/disconnected.
 - 12) Equipment or system tests and start-ups.
 - 13) Partial completions/occupancies.
 - 14) Substantial Completions authorized.
- 6. SHOP DRAWINGS
 - a. The contractor shall perform no portion of the Work requiring submittal and review of shops drawings, product data, samples or similar submittals until the respective submittal has been approved by the Architect
 - b. Submit newly prepared information drawn accurately to scale.
 - 1) Highlight, encircle, or otherwise indicate deviations from the Contract Documents.
 - 2) Do not reproduce Contract Documents or copy standard information as the bases of Shop Drawings.

- 3) Standard information prepared without specific reference to the Project is <u>not</u> a Shop Drawing.
- c. <u>AutoCAD Drawings</u>: CD copy of Drawings may be available from the Architect. The Contractor requiring this service must contact the Architect to verify availability.
 - 1) Cost to obtain AutoCAD drawings will be \$50.00 per Drawing sheet.
 - 2) Request for CD copy should be addressed to the Project Architect.
- d. Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
- e. Advertising brochures <u>will not</u> be accepted as shop drawings.
- f. Erection and setting drawings as referred to in these Specifications will be considered as shop drawings and shall be submitted along with detailed shop drawings.
- g. Where schedules are required to indicate locations, they shall be submitted as part of the shop drawings package for that item.
- h. Shop drawings and schedules shall repeat the identification shown on the Contract Drawings.
 - 1) Include the following information:
 - 2) Dimensions.
 - 3) Identification of products and materials included by sheet and detail number or by schedule identification number.
 - 4) Compliance with specified standards.
 - 5) Notation of coordination requirements.
 - 6) Notation of dimensions established by field measurements.
- i. <u>Preparation of Submittals</u>: Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, submittal name, and similar information to distinguish it from other submittals.
 - 1) Show Contractor's executed review and approval marking and provide space for Architect's "action" marking.
 - 2) Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the General Contractor will be returned "without action".
- j. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
- k. The Contractor shall make corrections required by the Architect and shall resubmit the required number of corrected copies of shop drawings until appropriately marked.
 - 1) The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Architect on previous submissions.

- I. The Architect will review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents.
 - 1) The Architect's review of a separate item shall not indicate review of an assembly in which the item functions.
- m. Only shop drawings, product data, and samples marked "No Exceptions Taken" or "Note Markings/Confirm" shall be considered "final" and used in conjunction with the work of this Project.
- n. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- o. The Architect's review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents.
 - 1) The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences, or procedures.
 - 2) The Architect's approval of a specific item shall not indicate approval of an assembly of which it is a component.
- p. Notations and remarks added to shop drawings by the Architect are to ensure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost.
- q. Should deviations, discrepancies, or conflicts between shop and contract drawings and Specifications be discovered, either prior to or after review, Contract Documents shall control and be followed.
- r. The following number of shop drawings and product data submittals shall be made on this Project.
 - 1) Where an insufficient number of copies are submitted, no action will be taken until the proper number of copies have been received.
 - Additional copies beyond the number required will be discarded unless review of additional copies is <u>specifically requested</u> by the General Contractor in his transmittal.
- s. Shop drawings will be marked as follows: Contractor shall take the following action for each respective marking:
 - 1) "NO EXCEPTIONS TAKEN" Copies will be distributed as indicated under above schedule.
 - 2) "NOTE MARKINGS/CONFIRM" Final but Restricted Release; Contractor may proceed with fabrication, taking into account the necessary corrections on submittal and with Contract Documents.
 - 3) "NOTE MARKINGS/RESUBMIT" Contractor may proceed with fabrication, taking into account the necessary corrections.
 - a) Corrected shop drawings shall be resubmitted before fabrication of this work is complete to obtain a different action marking.

- b) Do not allow drawings marked "Resubmit" to be used in connection with installation of the Work.
- 4) "REJECTED" Contractor will be required to resubmit shop drawings in their entirety.
 - a) No fabrication or installation shall be started until shop drawings so marked have been completely revised, resubmitted, and marked by Architect according to preceding Paragraphs a or b.
- t. Where resubmittal is required, five (5) copies will be marked up and so noted of which the following distribution shall be made:
 - 1) One (1) copy each will be retained for Architect and Consultant's files.
 - a) One (1) copy Owner's file.
 - b) Two (2) copies will be returned with corrections:
 - c) One (1) copy for Contractor.
 - d) One (1) copy for supplier/subcontractor.

7. PRODUCT DATA

- a. Collect Product Data into a single submittal for each element of construction or system.
 - 1) Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, rough-in diagrams and templates, standard wiring diagrams, and performance curves.
 - a) Mark each copy to show applicable choices and options. Where printed
 - b) Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - (i) Manufacturer's printed recommendations.
 - (ii) Compliance with trade association standards.
 - (iii) Compliance with recognized testing agency standards.
 - (iv) Application of testing agency labels and seals.
 - (v) Notation of dimensions verified by field measurement.
 - (vi) Notation of coordination requirements.
- b. <u>Submittals</u>: The Architect will retain two (2) and will return the others marked with action taken and corrections or modifications required.
 - 1) Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
- c. <u>Distribution</u>: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - 1) Do not proceed with installation until a copy of Product Data is in the installer's possession.
 - 2) Do not permit use of unmarked copies of Product Data in connection with construction.
- In compliance with the OSHA Hazard Communication Standard (1910.1200, 08-24-1987), Contractors shall post at the site MSDS (Material Safety Data Sheets) for <u>ALL</u> products classified as hazardous that their firm has knowledge that they will be furnishing, using, or storing on the job site during the duration of this Project in accordance with OSHA standards.

- 1) At the completion of the project, the Contractor shall turn their "MSDS" information directly over to the Owner with a receipt for the Owner to sign.
 - a) A copy of the signed receipt only shall be submitted to the Architect.
- e. Material Safety Data Sheets (MSDS) shall <u>not</u> be submitted to the Architect for review. Material Safety Data Sheets submitted to Architect will be returned with no action taken.

8. SAMPLES

- a. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed.
- b. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
- c. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated.
- d. Prepare Samples to match the Architect's Sample. Include the following:
 - 1) Generic description of the Sample.
 - 2) Sample source.
 - 3) Product name or name of manufacturer.
 - 4) Compliance with recognized standards.
 - 5) Availability and delivery time.
- e. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual components delivered and installed.
- f. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than three (3)), that show approximate limits of the variations.
- g. Refer to other Specification Sections and/or drawings for requirements for Samples which illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- h. <u>Preliminary Submittals</u>: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit one (1) full set of choices for the material or product.
 - 1) Preliminary submittals will be reviewed and returned with the Architect's mark indicating selection and other action.
- i. <u>Submittals</u>: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit four (4) sets; two (2) will be returned marked with the action taken.
 - 1) Maintain sets of Samples, as returned, at the Project site, for quality comparisons through the course of construction.
 - 2) Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

- 3) Sample sets may be used to obtain final acceptance of the construction associated with each set.
- j. <u>Distribution of Samples</u>: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
- k. Field Samples specified in individual Sections and/or drawings are special types of Samples.
 - 1) Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - 2) Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.
- 9. ARCHITECT'S ACTION
 - a. Except for submittals for record, information, or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicated action taken, and return promptly.
 - b. Compliance with specified characteristics is the Contractor's responsibility.
 - c. The Architect will stamp each submittal with a uniform, self-explanatory action stamp.
 - d. The Architect's action shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of the deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the samples.
 - e. Unless otherwise specified, samples shall be in triplicate and of adequate size to show function, equality, type, color, range, finish, and texture of material.
 - 1) When requested, full technical information and certified test data shall be supplied.
 - f. Each sample shall be labeled, bearing material name and quality, the Contractor's name, date, project name, and other pertinent data.
 - g. Transportation charges to and from the Architect's office must be prepaid on samples forwarded.
 - 1) Samples shall be retained by the Architect until the Work for which they were submitted has been accepted.
 - h. Materials shall not be ordered until final review is received in writing from the Architect.
 - 1) Materials shall be furnished, equal in every respect to reviewed samples.
 - 2) Where color or shade cannot be guaranteed, the maximum deviation shall be indicated by the manufacturer.
 - 3) Work shall be in accordance with the final reviewed samples.

- B. PRODUCTS (Not Applicable)
- C. EXECUTION (Not Applicable)

01 42 00 - REFERENCE DEFINITIONS AND STANDARDS

A. GENERAL

- 1. DEFINITIONS
 - a. <u>General</u>: Basic Contract definitions are included in the Conditions of the Contract.
 - b. <u>Indicated:</u> The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, schedules, and specified are used to help the reader locate the reference. There is no limitation on location.
 - c. <u>Include:</u> The term include, includes or included means a part of a whole. It is not a finite or all-inclusive term and shall not limit the scope of the work. It is an example or partial list only. There may be additional items required elsewhere in the Contract Documents.
 - d. <u>Directed:</u> Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases. However, no implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
 - e. <u>Approved:</u> The term approved, when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements, unless otherwise provided in the Contract Documents.
 - f. <u>Regulations</u>: The term regulations include laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether or not lawfully imposed by authorities having jurisdiction.
 - g. <u>Furnish</u>: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - h. <u>Install</u>: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 - i. <u>Provide</u>: The term provide means to furnish and install, complete and ready for the intended use.
 - j. <u>Installed</u>: An Installer is the Contractor, or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of the lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - k. The term experienced, when used with term Installer, means having satisfactory completed not less than five previous projects similar in size and scope to the

Project, being familiar with the special requirements necessary to successfully complete the work indicated, and having complied with requirements of the authority having jurisdiction.

- I. <u>Trades:</u> Using terms such as carpentry are not intended to imply that certain construction activities must be performed by accredited or union member individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- m. <u>Assigning Specialists:</u> Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no choice or option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
- n. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
- o. <u>Project Site:</u> The project site is the space available to the Contractor for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- p. <u>Testing Agencies:</u> A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

2. SPECIFICATION FORMAT AND CONTENT EXPLANATION

- a. <u>Specification Format:</u> These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 48-Division Format and "Masterformat" numbering system.
- b. <u>Specification Content:</u> This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
- c. <u>Abbreviated Language:</u> Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words which are implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicate.
- d. <u>Imperative and Streamlined Language:</u> is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

e. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

3. INDUSTRY STANDARDS

- a. <u>Applicability of Standards</u>: Except where the Contract documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- b. <u>Publication Dates:</u> Comply with the standards in effect as of the date of the Contract Documents.
- c. <u>Conflicting Requirements:</u> Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements which are different but apparently equal and other uncertainties to the Architect for a decision before proceeding.
- d. <u>Minimum Quantity or Quality Levels</u>: The quantity of quality level indicated shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- e. <u>Copies of Standards:</u> Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source. Maintain one copy of required standards at the Project Site available for reference by persons who have a reasonable need.
- f. <u>Abbreviations and Names:</u> Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "encyclopedia of Association," published by Gale Research Co., available in most libraries and are on file in the Office of the Architect.

4. GOVERNING REGULATIONS AND AUTHORITIES

a. <u>Copies of Regulations:</u> The Construction Manager and Contractors for Plumbing Work, Mechanical (HVAC) Work, and Electrical Work shall obtain copies of the following regulations and maintain at the Project site to be available for reference by parties who have a reasonable need:

- b. <u>Indiana State Codes:</u> Current issue with amendments for the work related to their Contract.
- 5. SUBMITTALS
 - a. <u>Permits, Licenses, and Certificates:</u> For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.
- B. PRODUCTS (Not Applicable)
- C. EXECUTION (Not Applicable)

01 50 00 - TEMPORARY FACILITIES AND CONTROLS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Conditions of the Contract.
 - b. Section 01 11 01 SUMMARY OF WORK
 - c. Section 01 31 00 PROJECT COORDINATION
 - 2. SUMMARY
 - a. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, and security and protection, building excavation, building concrete, and structural steel and plank erection durations.
 - b. Temporary utilities required and the responsible Contractor include, but are not limited to:
 - 1) <u>Water Service and Distribution</u>:
 - a) Cost of water used from utility only will be paid for by the Owner.
 - b) Temporary electrical service, power distribution and lighting.
 - c) Cost of energy used will be paid for by the Owner.
 - 2) <u>Telephone Service:</u>
 - a) Each Contractor supplies his own. The Owner's and Construction Manager's phone will not be used by Contractors.
 - 3) Temporary construction and support facilities are required, and the responsible Contractor include, but are not limited to:
 - a) <u>Temporary Heat, Before Enclosure</u>:
 - (i) Each Contractor provides his own.
 - b) <u>Temporary Heat, After Enclosure</u>:
 - (i) Construction Manager
 - c) <u>Field Offices and Storage Sheds:</u>
 - (i) Each Contractor provides his own.
 - d) <u>Sanitary Facilities (Temporary Toilets):</u>
 - (i) Construction Manager
 - e) <u>Temporary Enclosures and Dust Partitions</u>:
 - (i) Before building enclosure Each Contractor provides his own.
 - (ii) At building enclosure and thereafter Construction Manager
 - f) <u>Drinking Water</u>:
 - (i) Each Contractor provides his own.
 - g) <u>Hoists:</u>
 - (i) Each Contractor provides his own.
 - h) <u>Waste Disposal Services</u>:
 - (i) Construction Manager
 - i) <u>Project Cleaning Daily and Weekly</u>:
 - (i) Each Contractor provides his own.
 - j) Construction Aids and Miscellaneous Services and Facilities:
 - (i) Each Contractor provides his own.

- 4) Security and protection facilities required and provided by each Contractor:
 - a) Barricade, Warning Signs, and Lights.
 - b) Environmental Protection.
 - c) Utility Protection.
- 5) Security and protection facilities required and provided by the selected contractors:
 - a) <u>Temporary Fire Protection:</u>
 - (i) Construction Manager
 - b) <u>Project Identification Sign and Bulletin Boards:</u>
 - (i) Construction Manager
 - c) <u>Security:</u>
 - (i) Each Contractor provides his own.
- 3. QUALITY ASSURANCE
 - a. <u>Regulations</u>: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
 - 1) Building Code Requirements.
 - 2) Health and Safety Regulations.
 - 3) Utility Company Regulations.
 - 4) Police, Fire Department, and Rescue Squad Rules.
 - 5) Environmental Protection Regulations.
 - b. <u>Standards</u>: Comply with NFPA Code 241, "Building Construction and Demolition Operations," ANSI-A10 Series Standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1) Refer to "guidelines for Bid Conditions for Temporary Job Utilities and Services," prepared jointly by AGC and ASC, for industry recommendations.
 - 2) <u>Electrical Service</u>: Comply with NFPA, OSHA, and UL standards and regulations and all applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on the performance of the Work. Provide service in compliance with national Electric Code (NFPA 70).
 - c. <u>Inspections</u>: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use.
 - 1) Obtain required certifications and permits.
- 4. PROJECT CONDITIONS
 - a. <u>Conditions of Use</u>:
 - 1) Keep temporary services and facilities clean and neat in appearance.
 - 2) Operate in a safe and efficient manner.
 - 3) Take necessary fire prevention measures.
 - 4) Do not overload facilities or permit them to interfere with progress.
 - 5) Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- 5. OPERATION, TERMINATION, AND REMOVAL
 - a. <u>Supervision</u>:

- 1) Enforce strict discipline in use of temporary facilities.
- 2) Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- Maintain facilities in good operating condition until removal. b. Maintenance: Protect from damage by freezing temperatures and similar elements.
 - Maintain operation of temporary enclosures, heating, cooling, humidity 1) control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid the possibility of damage.
 - Prevent water-filled piping from freezing. 2) 3)
 - Maintain markers for underground lines.
 - Protect from damage during excavation operations. a)
- C. Termination and Removal: Unless the Construction Manager requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion.
 - Complete or, if necessary, restore permanent construction which may 1) have been delayed because of interference with the temporary facility.
 - Repair damaged Work, clean exposed surfaces and replace construction 2) which cannot be satisfactorily repaired.
 - Materials and facilities which constitute temporary facilities are property 3) of the Contractor.
 - If directed by the Construction Manager to install during construction, 4) remove temporary paving which is not intended for or acceptable for integration into permanent paving.
 - Where the area is intended for landscape development, remove a) soil and aggregate fill which does not comply with requirements for fill or subsoil in the area.
 - Remove materials contaminated with road oil, asphalt and other b) petrochemical compounds, and other substances which might impair growth of plant materials or lawns.
 - Repair or replace street paving, curbs and sidewalks at the C) temporary entrances as required by the governing authority.
 - At Substantial Completion, clean and renovate permanent facilities which 5) have been used during the construction period.
- Β. PRODUCTS (Not Used)
- C. **EXECUTION**
 - TEMPORARY UTILITY INSTALLATION 1.
 - General: Engage the appropriate local utility to install temporary service or a. connect to existing service.
 - 1) Where the utility provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the utility's recommendations.
 - Provide adequate capacity at each stage of construction. 2)
 - Prior to temporary utility availability, provide trucked-in services. 3)
 - Obtain easements to bring temporary utilities to the site, where the 4) Owner's easements cannot be used for that purpose.

- 5) Cost of use charges for temporary facilities shall be the responsibility of the Contractor unless otherwise indicated.
 - a) User charges for water and electricity consumption will be paid by Owner.
- b. <u>Water Service</u>:
 - 1) Provide water service and distribute piping of sizes and pressures adequate for construction.

2. TEMPORARY ELECTRICAL

- a. Any electrical energy required by the Contractors for their respective office trailers, storage sheds, etc., will be the responsibility of said Contractor.
- b. The Electrical Contractor shall make arrangements for and pay for installation of temporary services.
 - 1) Any charges for connections to mains, extensions, furnishing of meters or equipment, etc., shall be included in the Electrical Contractor's bid.
 - a) Regardless of whether the Owner may have to sign with the utility company for any or all of these services, the Contractor shall include in his proposal all fees, inspection charges, permit charges, work changes, etc., and shall be ready to deposit with the utility company said fees when required at time of Owner's signing for utility service.
- c. Temporary service for the project shall consist of two (2) services from existing electrical panel.
 - 1) The service shall be 120/208 volt, single-phase, three-wire plus ground, of capacity as described in the following paragraphs.
 - 2) Temporary electric service distribution panel shall be located in a weather-tight enclosure with globe and guard incandescent lighting fixture, light switch, receptacle and lock-doors by the Contractor.
 - a) The temporary services shall be of 200 amp capacity as located by the Construction Manager with feeders from distribution point to all areas of new construction.
- d. Site Electrical Utilities Contractor shall provide the following temporary lighting and power distribution system for the temporary services for the project.
 - 1) Provide one (1) thirty (30) circuit load center panel with 200 amp main disconnect and with a minimum of six (6) 20 ampere receptacles (one (1) per circuit) at the point of service.
 - 2) Provide 60 ampere, three wire plus ground circuit with appropriate outlets at the point of service for miscellaneous power taps.
 - 3) Utilize existing power sources for work in existing building.
 - a) Provide over-current protective device at point of service.
 - 4) Extend temporary wiring for lighting on to floors upon the request of the Construction Manager for lighting of workspaces.
 - 5) All circuits and/or feeders shall be protected by appropriately rated ground fault detection and interruption devices.
 - 6) In addition to the preceding temporary power and lighting, provide and subsequently remove circuits for:
 - a) Temporary safety lighting and security lighting provide lights to work at all hours of darkness; safety lighting shall be continuous during working hours.

- b) All lamps for temporary lighting shall be provided and maintained by the Site Electrical Utility Contractor at his expense.
 - (i) Every temporary lamp outlet must be properly lamped at all times throughout construction; all dark or burned-out lamps shall be immediately replaced.
- c) Wiring of Contractors' offices, trailers, storage facilities, etc., used during construction, shall be the responsibility of the individual Contractors requiring the same.
 - Site Electrical Utility Contractor to provide wiring, conduit, panel, and feed to existing services to energize Construction Manager trailer and remove at project completion.
- d) Where a Contractor requires the use of energy at places other than those herein specified, or of an amount greater than would be available from the specified temporary service, the Contractor shall make independent arrangements with the Electrical Contractor for the service at his own expense.
- e) When permanent facilities are approved by the Architect as ready for operation, they may be used for temporary light and power.
 - (i) The Electrical Contractor shall arrange with the utility for removal of the temporary metering and the installation of the permanent meters and shall bear all costs involved in the changeover.
- f) Upon approval of use and completion of the changeover to the permanent electrical system, the Electrical Contractor shall remove all portions of the temporary electrical services, including power and lighting distribution and/or utilization equipment and wiring.
- g) Should the demolition of any existing facilities require that power facilities which are to remain, be interrupted for any duration of time exceeding one hour, the Electrical Contractor for this project shall provide proper and adequate temporary electrical service to the facilities remaining until such time as permanent service to the remaining facilities can be restored.

3. TEMPORARY TELEPHONE

- a. Services will have been provided to the central project jobsite office to include the needs of the Construction Manager, the Architect, and the Owner.
 - 1) This service cost will be paid by the Construction Manager.
- b. All Contractors shall be responsible for their own telephone service.
 - 1) The service of the Construction Manager's telephone will not be available to the Contractor.
- c. Party placing toll calls pays costs of tolls.
- 4. TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION
 - a. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 - 1) Coordinate through Construction Manager.

- b. Maintain temporary construction and support facilities until near Substantial Completion.
 - 1) Remove prior to Substantial Completion.
 - 2) Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- c. Provide incombustible construction for offices, shops, and sheds located within the construction area, or within 30' of building lines.
 - 1) Comply with requirements of NFPA 241.
- d. <u>Temporary Heat, Before Enclosure (by each Contractor):</u>
 - 1) Refer to "E" below for definition of "enclosure."
 - 2) Each contractor shall provide temporary heat as required by his construction activities and bear all costs for the operation thereof.
 - 3) The Construction Manager, through allowances, will provide portable heating equipment in accordance with Temporary Heat, after enclosure.
- e. <u>Temporary Heat and Ventilation, after Enclosure through Allowance</u>:
 - 1) Enclosure is defined as that point when construction is sufficiently complete that, with the use of minimal temporary enclosures, heat and ventilation can be maintained as required for the installation of finish materials and equipment.
 - a) Construction Manager shall coordinate the need for and timing of enclosure.
 - 2) Provide temporary heat, ventilation, and cooling (when permanent system available) required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low or high temperatures or high humidity.
 - a) Select safe equipment which will not have a harmful effect on completed installations or elements being installed.
 - b) Coordinate ventilation requirements to product the ambient condition required and minimize consumption of energy.
 - c) Except where use of the permanent system is authorized, provide vented self-contained LP gas or natural gas heaters with individual space thermostatic control.
 - d) Use of gasoline-burning space heaters, open flame, or salamander-type heating units is prohibited.
 - e) All electrical wiring required for temporary heating shall be provided by the Electrical Contractor from the temporary existing wiring service.
- f. Permanent heating, ventilating and cooling systems may be used at the discretion of the Construction Manager, subject to the following requirements.
 - 1) Systems shall be completely installed as designed including permanent wiring connections to permanent power sources.
 - a) Arrange with installing contractor for operation and maintenance of systems including personnel to monitor efficient use.
 - Filter material shall be in place over all return air openings, outside air openings, and any openings where negative pressures are present in the duct system.
 - b) Change filters and filter material when "build-up" of filtered dust substantially affects operation.

- g. Maintain a working temperature of not less than 50° F in all parts of the building during working hours, with a minimum of 35° F outside of work hours unless otherwise required by individual Sections or following paragraphs.
 - 1) This includes all area where work has been installed which might be subject to damage by freezing.
- h. For a period of seven (7) days prior to interior finishing (wood painting, varnishing, resilient tile, ceilings, etc.) and until final acceptance of occupancy by Owner, maintain minimum temperatures of 68° F during working hours and 60° F at all other times.
 - 1) Provide and maintain appropriate humidity conditions for installation of woodwork, cabinets, acoustic tile, etc.
 - 2) When permanent system is not available for dehumidification purposes, provide air movement, air replacement and higher air temperatures as methods to attain maximum relative humidity requirements.
- i. Just prior to Substantial completion, the Building Mechanical Contractor, to be awarded in Bid Package Three, will provide maintenance and/or repairs required to place heating, ventilating and cooling systems in "like new" condition, including but not limited to the following:
 - 1) Cleaning of pipe, ductwork, and parts.
 - 2) Oiling and greasing of equipment or parts that would normally require same in a periodic maintenance program.
 - 3) Replacement of all filters in air systems.
 - a) This shall be accomplished prior to balancing of systems.
 - 4) Replacement of significantly worn parts and parts which have been subject to unusual operating conditions.
 - 5) Cleaning of water strainers in heating, cooling, and plumbing systems.
- j. The provisions of this article shall not in any way change or modify the requirements of the General Conditions concerning the warranty-guarantee period which follows Substantial Completion.
 - 1) Contractor shall pay all costs, if any, to extend manufacturer's warranty on all items of equipment used for temporary facilities.
- k. Cost of Temporary Heating Systems:
 - 1) The cost of installing and maintaining temporary heating systems before enclosure will be borne by each Contractor requiring same.
 - 2) The cost of installing portable temporary heating systems after enclosure will be borne by the Construction Manager, through allowance.
 - 3) The cost of using permanent systems for heating, cooling, and ventilating prior to occupancy will be borne by the Construction Manager, through allowance.
 - 4) The cost of energy consumption will be borne by the affected Contractor as limited in Paragraph 8.a.
 - 5) The cost of energy consumption will be borne by the Owner, through the Construction Manager, as limited in Paragraph 8.b. and 8.c., by allowances.

5. CENTRAL PROJECT JOBSITE FIELD OFFICE

a. The Owner, through the Construction Manager, will provide and maintain a central project office for the representatives of the Architect, the Construction Manager, and the Owner for their exclusive use.

- 1) This office space will also be used for progress meetings unless notified otherwise.
- 6. TEMPORARY STRUCTURES OFFICES AND SHEDS
 - a. Temporary structures required for offices, storage or other purposes in the performance of the work, shall be located and erected only with approval of the Construction Manager and Owner and shall be removed and the premises shall be cleaned of all debris and stored to original condition when directed.
 - b. All temporary work shed and offices, if of combustible construction, shall be located at least thirty (30) feet from the building.
 - c. All temporary utilities, electrical service, and telephone service shall be provided by each Contractor and subcontractor for their respective construction trailers, offices, work areas, etc., and shall be located at the discretion of the Construction Manager.
 - d. As required by the Construction Manager, due to construction requirements, moving and relocating of trailers and offices will be the responsibility of the Contractor or subcontractor involved, including all costs associated therewith.
 - e. No signs will be allowed to be erected on the site or on the building unless approved by the Construction Manager.
- 7. TEMPORARY PARKING
 - a. Parking for Contractors' employees will be at the direction of the Owner or the Construction Manager.
- 8. TEMPORARY SANITARY FACILITIES
 - a. Construction Manager
- 9. DEWATERING FACILITIES AND DRAINS
 - a. For temporary drainage and dewatering facilities and operations not directly associates with construction activities included under individual Sections, comply with dewatering requirements of applicable Division <u>2</u> SITEWORK sections. Where feasible, utilize the same facilities.
 - 1) Maintain the site, excavations and construction free of water.
 - 2) Provide, operate, and maintain pumping equipment.
 - b. Dispose of rainwater in a lawful manner which will not result in flooding the project or adjoining property, not endanger permanent Work of temporary facilities.
 - c. Provide temporary drainage where roofing or similar waterproof deck construction is completed prior to connection and operation of permanent drainage piping system.
- 10. EROSION AND SEDIMENT CONTROL

- a. Conform to requirements of regulatory agencies as called for in the General Conditions. The following list is included as a bidding and construction aid and is not intended to represent all agencies with jurisdiction over this project.
 - 1) Environmental Protection Agency
 - 2) Corps of Engineers
 - 3) Department of Agriculture, Soil Conservation Service
 - 4) State of Indiana, Stream Pollution Control Board
 - 5) State of Indiana, Department of Natural Resources, Division of Water
 - 6) County and municipal regulatory agencies
- b. <u>Certificates</u>
 - 1) Prior to delivery, submit two (2) copies of all certificates specified herein.
 - 2) Certificates shall be notarized and attest to compliance with the applicable specifications for grades, types, or classes.
- c. <u>Containers</u>
 - 1) Containers shall be unopened at delivery and the respective labels shall show contents and compliance with all applicable laws.
 - 2) Store containers off the ground and protect form the weather.
 - 3) Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits.
 - 4) Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative.
 - 5) The area of bare soil exposed at any one time by construction operations should be held to a minimum.
 - 6) Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams.
 - 7) Protect site from puddling or running water.
 - a) Provide water/silt barriers as required to protect site from soil erosion.
 - 8) IMMEDIATELY ON THE AWARD OF CONTRACT, CONTRACTOR SHALL APPLY FOR AND OBTAIN INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT APPROVAL.

11. TEMPORARY ENCLOSURES

- a. Provide temporary enclosures for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
 - 1) Any temporary closures and weather protection required for a Contractor's material installation shall be borne by the respective Contractor.
- b. Install tarpaulins, etc., securely, with non-combustible wood-framing and other materials. Close openings of 25 s.f. or less with plywood or similar materials.
- c. Close openings through floor or roof decks and horizontal surfaces with loadbearing wood-framed construction.
d. Where temporary wood or plywood enclosure exceeds 100 s.f. in area, use ULlabeled fire-retardant treated material for framing and main sheathing.

12. DRINKING WATER

- a. Each Prime Contractor shall provide drinking water for all trades under their contract during the construction of the project.
 - 1) Provide sanitary paper cups, ice, and disposal containers.

13. WASTE DISPOSAL SERVICES

- a. Construction Manager will provide 30 CY dumpster-type rubbish containers for the project general waste, debris, and rubbish for the duration of the project from initial excavations through building concrete completion.
 - 1) Contractors will be required to sort their trash into the appropriate recycling and waste containers.
- b. Container contents will be disposed of weekly or at more frequent intervals if required by inadequate container capacity.
- c. Each prime Contractor is responsible for removal of his rubbish from the building/job site to the containers furnished and described under Paragraph a.
- d. Disposal of any hazardous material or specialized waste will not be permitted to be placed in any rubbish container on site.
- e. The prime contractors performing selective demolition, are required to provide adequate means and methods to remove and haul off site, all existing materials and equipment specified in the demolition scope of work requirements.
 - 1) If dumpster-type containers are used for this work, the Construction Manager will be notified and will pre-approve location and placement of these containers.
 - a) Any safety requirements necessary to provide access and dumping into these containers are the responsibility of the Contractor providing same.
- f. The prime Roofing Contractor will provide and pay for a separate rubbish container for roofing debris.
- g. The Finishing Contractor (Painter) will <u>not</u> be permitted to use any rubbish container for disposal of empty paint containers.
- h. All Contractors need to break down all boxes and packages to reduce the volume of waste.
 - 1) Violators will be charged for the cost of that unit's disposal.

14. DAILY CLEANING

- a. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
- b. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

- c. During progress of work, clean site and public properties and dispose of waste materials, debris and rubbish in trash barrels provided by the Construction Manager.
- d. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- e. Schedule cleaning operation so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- f. Contractors failing to provide daily cleaning as noted above will be given 24-hour notice to complete the work or the Construction Manager shall have the right to contract the work done and the cost thereof deducted from payment due the Contractor.

15. WEEKLY CLEANING

- a. Execute weekly cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish which cannot be identified as belonging to a contract category.
 - 1) Dispose of waste materials, debris and rubbish in dumpster-style rubbish container as provided under this Section of Work.
- b. Remove excessive dust, dirt, mud, and debris from floors, walls, and other interior surfaces.
- c. Broom clean paved surfaces; rake clean other surfaces of grounds.
- d. The Construction Manager will determine job conditions and requirement for cleaning up.
 - 1) If, for any reason, the job is not maintained in an orderly and satisfactory condition, the Construction Manager reserves the right to establish who is responsible for said scrap, debris, and unused equipment.
 - a) If cooperation in this matter is not forthcoming within receipt of 24-hour notice, the Construction Manager reserves the right to contract for removal of said materials and back-charge the responsible Contractor.

16. RODENT AND PEST CONTROL

- a. Before foundation Work has been completed, and again once building is enclosed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests.
 - 1) Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion.
 - 2) Perform control operations in a lawful manner using environmentally safe materials.
- 17. CONSTRUCTION AIDS AND MISCELLANEOUS SERVICES AND FACILITIES

- a. <u>General</u>: Design, construct, and maintain construction aids and miscellaneous services and facilities as needed to accommodate performance of work. These include, but are not limited to the following:
 - 1) Temporary Stairs and Ladders.
 - 2) Guardrails and Barriers.
 - 3) Walkways.
- b. <u>Stairs</u>: Until permanent stairs are available, provide temporary stairs where ladders are not adequate for performance of work.
 - 1) Cover finished permanent stairs exposed to occupants' use, with a durable protective covering of plywood or similar material so that finishes will be undamaged at the time of acceptance.
- c. <u>Walkways</u>: Install and maintain temporary walkways around construction work and to field offices, toilets and similar places.
 - Construction walkways of washed, well-graded gravel 6" deep by 36" wide, or duckboard units 30" wide with 1" x 6" rough-sawn cross boards on a pair of 3 x 4 runners in 12' lengths.
- d. <u>Responsibility</u>: Construction aids and miscellaneous facilities required exclusively by one prime contractor are the responsibility of the contractor.

18. BARRICADES, WARNING SIGNS, AND LIGHTS

- a. Comply with standards and code requirements for erection of structurally adequate barricades.
 - 1) Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against.
 - 2) Where appropriate and needed, provide lighting, including flashing red or amber lights.

19. ENVIRONMENTAL PROTECTION

- a. Provide protection, operate temporary facilities and conduct construction in ways and by methods which comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
- b. Avoid use of tools and equipment which produce harmful noise.
 - 1) Restrict use of noise-making tools and equipment to hours which will minimize complaints from persons or firms near the site.

20. UTILITY PROTECTION

- a. Existing utility lines and structures indicated or known shall be protected from damage during construction operations.
 - 1) Locate and flag all lines and structures before beginning excavation and other construction operations.
- b. Utility lines constructed for this Project shall be protected by the installing Contractor.
- c. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the Architect and Construction

Manager and affected utility in ample time for the necessary measures to be taken to prevent interruption of the services.

- d. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Architect and Construction Manager and the affected utility.
 - 1) If determined that repairs are required under the Contract, the cost of such repairs will be covered by Change order.

21. TEMPORARY FIRE PROTECTION

- a. Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
 - 1) Meet all State and Federal OSHA regulations.
- b. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
- c. Store combustible materials in containers in fire-safe locations.
- d. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for righting fires.
 - 1) Prohibit smoking in hazardous fire exposure areas.
- e. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

22. PROJECT SIGNS

- a. By Construction Manager.
- b. Provide project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project.
 - 1) Do not permit installation of unauthorized signs.
- c. Construct signs of exterior type, Grade B-B HD concrete form Overlay Plywood, PS-1, ³/₄" unless otherwise indicated.
 - 1) Support on posts or framing of treated wood or steel.
- d. <u>Finish</u>: Engage experienced painter to finish and apply graphics.
 - 1) Comply with details indicated.
 - 2) Provide exterior grade gloss enamel over exterior primer.
- e. <u>Traffic Control Signs</u>: Provide and maintain adequate signage to control construction and pedestrian traffic as specified, indicated and/or required for normal construction of the Project.
- 23. SECURITY
 - a. By Construction Manager.

- b. Install substantial temporary enclosure of partially completed areas of construction.
 - 1) Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
- c. Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup.
 - Enforce discipline on connection with the installation and release of material to minimize the opportunity for theft and vandalism.

24. FINAL CLEANING

1)

a. Unless noted elsewhere in the specifications, the Construction Manager will solicit and contract final cleaning prior to occupancy.

01 56 00 - TEMPORARY BARRIERS AND ENCLOSURES

A. GENERAL

- 1. SCOPE
 - a. This section covers providing temporary wood doors, hung on temporary rough bucks at openings as required for safety and theft protection.
 - 1) Provide locks and keys for all doors and give Owner and Architect representative one (1) key each.
 - b. Cover and protect in an approved manner all delicate, finished construction including but not limited to limestone panels, millwork and cabinet work, glazing and susceptible to breakage, etc. from damage of any kind.
 - 1) Any inadvertent damage caused during demolition or new construction shall be repaired by the Contractor without cost to the Owner.
 - 2) Protect finish openings through which materials are transported by rough 2" planking or other acceptable covering at jamb.

01 60 00 - PRODUCTS REQUIREMENTS

A. GENERAL

1. SUMMARY

- a. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project
- b. <u>Multiple Contracts</u>: Provisions of this Section apply to the construction activities of each Contractor.
- c. <u>Standards</u>: Refer to Section <u>01 42 00 REFERENCE DEFINITIONS AND</u> <u>STANDARDS</u> for applicability of industry standards to products specified.
- d. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section <u>01 25 13 PRODUCT</u> <u>SUBSTITUTION PROCEDURES.</u>

2. DEFINITIONS

- a. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms.
 - 1) Such terms are self-explanatory and have well recognized meanings in the construction industry.
- b. <u>Products</u>: Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.
 - 1) The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- c. <u>Named Products:</u> Items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
- d. <u>Materials:</u> Products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- e. <u>Equipment:</u> Product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

3. SUBMITTALS

- a. <u>Product List Schedule</u>: Prepare a schedule showing products specified in a tabular form acceptable to the Architect.
 - 1) Include generic names of products required.
 - 2) Include the manufacturer's name and proprietary product names for each item listed.
 - 3) Coordinate the product list schedule with the Construction Schedule and the Schedule of Submittals.
- b. <u>Form</u>: Prepare the product listing schedule with information on each item tabulated under the following column headings:

- 1) Related Specification Section and/or drawing number.
- 2) Generic name used in Contract Documents.
- 3) Proprietary name, model number, and similar designations.
- 4) Manufacturer's name and address.
- 5) Supplier's name and address.
- 6) Installer's name and address.
- 7) Projected delivery date, or time span of delivery period.
- c. <u>Completed Schedule</u>: Within sixty (60) days after date of commencement of the Work, submit three (3) copies of the completed product list schedule.
 - 1) Provide a written explanation for omissions of data, and for known variations from Contract requirements.
- d. <u>Owner's Action</u>: The Owner and Construction Manager will review the completed product list schedule within two (2) weeks of receipt of said schedule from the Contractor.
 - 1) No response within this time period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents.
- 4. QUALITY ASSURANCE
 - a. <u>Source Limitations</u>: To the fullest extent possible, provide products of the same kind, from a single source.
 - b. <u>Compatibility of Options</u>: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 - 1) Each Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other Contractors.
 - 2) If a dispute arises between Contractors over concurrently selectable, but incompatible products, the Architect will determine which products shall be retained and which are incompatible and which are incompatible and must be replaced.
 - c. <u>Foreign Product Limitations</u>: Refer to Indiana State Law.
 - d. <u>Nameplates</u>: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
 - e. <u>Labels</u>: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - f. <u>Equipment Nameplates</u>: Provide a permanent nameplate on each item of serviceconnected or power-operated equipment.
 - 1) Locate on an easily accessible surface which is inconspicuous in occupied spaces.
 - 2) The nameplate shall contain the following information and other essential operating data:

- a) Name of Product and Manufacturer
- b) Model and Serial Number
- c) Capacity
- d) Speed
- e) Ratings

5. PRODUCT DELIVERY, STORAGE, AND HANDLING

- a. Deliver, store and handle products in accordance with the manufacturer's instructions, using means and methods that will prevent damage, deterioration and loss, including theft.
 - 1) Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 - 2) Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
 - 3) Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4) Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
 - 5) Store products at the site in a manner that will facilitate inspection and measurement of quantity of counting of units. PRODUCTS AND MATERIALS MAY NOT BE STORED WITHIN THE BUILDING. CONTRACTORS MUST PROVIDE THEIR OWN STORAGE TRAILERS IN LOCATIONS AS DIRECTED BY THE CONSTRUCTION MANAGER.
 - 6) Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 - 7) Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation.
 - a) Maintain temperature and humidity within range required by manufacturer's instructions.
 - 8) For exterior storage of fabricated products, place on sloped supports, above ground.
 - 9) Notify the Construction Manager, in writing, prior to storing materials offsite.
 - Approval from the Owner, through the Construction Manager, must be obtained prior to payment of off-site stored materials.
 Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
 - b) Procedures for off-site storage payment is as follows:
 - (i) Payment for Stored Material and Equipment will be made if Contractor includes with each monthly request the following two paragraphs to certify that all material and equipment for which payment is requested is in fact paid for by the Contractor and becomes the property of the Owner.
 - c) The Contractor certifies that all stored materials included in this Application for Payment are free and clear of all liens, claims, security interests or encumbrances and that no work, materials, or equipment covered hereby is subject to any retained interest by any other person.

- d) Title to all work materials and equipment covered by this Application for Payment which has not hereto before passed to the Owner is hereby conveyed and transferred to the Owner effective upon payment of this Application for Payment.
- 10) Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.
- 11) Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- 12) Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- 13) Periodically inspect to assure products are undamaged and are maintained in acceptable conditions.
- 14) Materials stored on-site or at approved off-site location shall be clearly labeled.
 - a) Names of the Contractor, Supplier, Owner, Architect, Construction Manager and Project shall be all materials for this project.

B. PRODUCTS

- 1. PRODUCT SELECTION
 - a. <u>General Product Requirements</u>: Provide products that comply with the General Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
 - 1) Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 - Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - b. <u>Product Selection Procedures</u>: Product selection is governed by the Contract Documents and governing regulations, not by previous project experience. Procedures governing product selection include the following:
 - c. <u>Proprietary Specification Requirements</u>: Where only a single product or manufacturer is named, provide the product indicated.
 - 1) No substitutions will be permitted unless noted otherwise.
 - d. <u>Semi-proprietary Specification Requirement</u>: Where two or more products or manufacturers are named, provide one of the products indicated.
 - 1) No substitutions will be permitted.
 - e. <u>Descriptive Specification Requirement</u>: Where Specifications describe a product or assembly, list exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 - f. <u>Performance Specification Requirements</u>: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.

- 1) General overall performance of a product is implied where the product is specified for a specific application.
- 2) Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
- g. <u>Compliance with Standards, Codes, and Regulations</u>: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes, or regulations specified.
- h. <u>Visual Matching</u>: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
- i. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for non-compliance with specified requirements.
- j. <u>Visual Selection</u>: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.
 - 1) When the manufacturer's "standard" selections are limited, the Architect may also select from the manufacturer's "non-standard" selections without any increase in the Contract Amount. Such selections will be limited to colors and patterns, and excludes textures.
- Allowances: Refer to individual Specification Sections <u>01 21 00 ALLOWANCES</u> for allowances that control product selection, and for procedures required for processing such selections.

2. INSTALLATION OF PRODUCTS

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

01 71 23 - FIELD ENGINEERING

- A. GENERAL
 - 1. SCOPE
 - a. This Section specifies administrative and procedural requirements for field engineering services, including, but not necessarily limited to, the following:
 - 1) Land Survey Work.
 - 2) Civil Engineering Services.
 - 3) Structural Engineering Services.
 - 2. RESPONSIBILITIES
 - a. All contractors shall be responsible for layout for their scope of work.
 - 3. SUBMITTALS
 - a. <u>Certificates:</u> Submit a certificate signed by the Land Surveyor or Professional Engineer certifying that the location and elevation of improvements comply with the Contract documents.
 - b. <u>Project Record Documents:</u> Submit a record of Work performed and record survey data.
 - 4. QUALITY ASSURANCE
 - a. <u>Surveyor:</u> Engage a Registered Land Surveyor registered in the State where the project is located, to perform land surveying services required.
 - b. <u>Engineer:</u> Engage a Professional Engineer of the discipline required, registered in Indiana, to perform required engineering services.
- B. PRODUCTS (Not Applicable)
- C. EXECUTION
 - 1. BENCHMARKS AND CONTROL POINTS
 - a. The Owner, through the Construction Manager, will identify existing control points.
 - b. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work.
 - 1) Locate and protect existing benchmarks and control points.
 - 2) Preserve permanent reference points during construction.
 - c. Do not change or relocate benchmarks or control points without prior written approval.
 - 1) Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
 - d. Promptly replace lost or destroyed project control points.
 - 1) Base replacements on the original survey control points.

- e. The Construction Manager will establish and maintain a minimum of two permanent benchmarks on the site, references to data established by survey control points.
 - 1) Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. EXISTING UTILITIES AND EQUIPMENT

- a. The existence and location of underground and other utilities and construction indicated as existing are not guaranteed.
 - 1) Before beginning site work, investigate and verify, if possible, the existence and location of underground utilities and other construction.
- b. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water service piping, and any underground utility services.

3. PERFORMANCE

- a. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project.
 - 1) Calculate and measure required dimensions within indicated or recognized tolerances.
 - 2) Do not scale Drawings to determine dimensions.
- b. Advise entities engaged in construction activities, or marked lines and levels provided for their use.
- c. As construction proceeds, check every major element for line, level and plumb.

01 73 29 - CUTTING AND PATCHING

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to this section.
- 2. SCOPE
 - a. This section specifies administrative and procedural requirements for cutting and patching.
 - b. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - c. Requirements of this Section apply to mechanical and electrical installations. Refer to drawings of Division <u>23 HVAC AIR DISTRIBUTION</u> and Division <u>26</u> <u>ELECTRICAL</u> sections for any other specific requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- 3. SUBMITTALS
 - a. <u>Cutting and Patching Proposal</u>: Where approval of procedures for cutting and patching is required before proceeding, submit to the Construction Manager a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed.
 - 1) Include the following information, as applicable, in the proposal.
 - a) Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
 - b) Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - c) List products to be used and firms or entities that will perform Work.
 - d) Indicate dates when cutting and patching is to be performed.
 - e) List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
 - f) Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
 - g) Approval by the Construction Manager to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.
- 4. QUALITY ASSURANCE
 - a. <u>Requirements for Structural Work</u>:

- 1) Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- 2) Obtain approval of the Architect before cutting and patching the following structural elements:
 - a) Founding Construction.
 - b) Bearing and Retaining Walls.
 - c) Structural Concrete.
 - d) Structural Steel.
 - e) Lintels.
 - f) Timber and Primary Wood Framing.
 - g) Structural Decking.
 - h) Miscellaneous Structural Metals.
 - i) Equipment Supports.
 - j) Piping, Ductwork, Vessels, and Equipment.
 - k) Structural Systems of Special Construction in Division 13.
- b. <u>Operational and Safety Limitations</u>:
 - 1) Do not cut and patch operating elements or safety-related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- c. Obtain approval of the Architect before cutting and patching. <u>The following</u> <u>operating elements or safety-related systems</u>:
 - 1) Shoring, Bracing, and Sheeting.
 - 2) Primary Operational Systems and Equipment.
 - 3) Air or Smoke Barriers.
 - 4) Water, Moisture, or Vapor Barriers.
 - 5) Membranes and Flashings.
 - 6) Fire Protection Systems.
 - 7) Noise and Vibration Control Elements and Systems.
 - 8) Control Systems.
 - 9) Communication Systems.
 - 10) Electrical Wiring Systems.
- d. <u>Visual Requirements</u>:
 - Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching.
 - a) Remove and replace Work cut and patched in a visually unsatisfactory manner.

B. PRODUCTS

- 1. MATERIALS
 - a. Use materials which are identical to existing materials.
 - 1) If identical materials are not available or cannot be used where exposed surfaces are involved, use materials which match existing adjacent surfaces to the fullest extent possible with regard to visual effect.
 - a) Use materials whose installed performance will equal or surpass that of existing materials.

C. EXECUTION

- 1. INSPECTION
 - a. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed.
 - 1) Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 - b. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades.
 - 1) Review areas of potential interference and conflict.
 - 2) Coordinate procedures and resolve potential conflicts before proceeding.

2. PREPARATION

- a. <u>Temporary Support</u>: Provide temporary support of Work to be cut.
- b. <u>Protection</u>: Protect existing construction during cutting and patching to prevent damage.
 - 1) Provide protection from adverse weather conditions for portions of the Project which might be exposed during cutting and patching operations.
- c. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- d. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3. PERFORMANCE

- a. <u>General</u>: Employ skilled workers to perform cutting and patching.
 - 1) Proceed with cutting and patching at the earliest feasible time and complete without delay.
- b. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- c. <u>Cutting</u>: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction.
 - 1) Where possible review proposed procedure with the original installer; comply with the original installer's recommendations.
- d. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping.
 - 1) Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces.
 - a) Temporarily cover openings when not in use.
- e. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

- f. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
- g. Comply with requirements of applicable Sections of Division <u>2 SITEWORK</u> where cutting and patching requires excavating and backfilling.
- h. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated, or abandoned.
 - 1) Cut-off pipe or conduit in walls or partitions to be removed.
 - Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- i. <u>Patching</u>: Patch with durable seams that are as invisible as possible.
 - 1) Comply with specified tolerances.
- j. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
- k. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a matter that will eliminate evidence of patching and refinishing.
- I. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance.
 - 1) Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
- m. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing patch, after the patched area has received primer and second coat.
- n. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

4. CLEANING

- a. Thoroughly clean areas and spaces where cutting and patching is performed or used as access.
 - 1) Remove completely paint, mortar, oils, putty, and items of similar nature.
 - 2) Thoroughly clean piping, conduit and similar features before painting or other finishing is applied.
 - 3) Restore damaged adjacent construction to its original condition (including water damage).

END SECTION

01 74 00 - CLEANING AND WASTE MANAGEMENT

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Section 01 11 00 SUMMARY OF WORK.
 - b. Cleaning for Specific Products or Work
 - c. Each Specification Section for that Work
 - d. All cleaning shall be the responsibility of the Contractor unless specifically noted otherwise.
 - e. Each subcontractor shall police and clean-up on a continuing basis, during his presence in the project, in all areas in which he is performing work; maintain premises and public properties free from accumulation of waste, debris, and rubbish.
 - f. At the completion of the Work, each subcontractor shall remove their waste materials, rubbish, tools, equipment, machinery, and surplus materials and clean all sight-exposed surfaces.
 - 1) Leave project clean and ready for final cleaning.

2. REQUIREMENTS FOR REGULATORY AGENCIES

- a. Maintain project in accordance with Occupational Safety and Health Act, latest edition, as it applies to clean-up.
- b. Conduct cleaning and disposal operations in compliance with local ordinances and anti-pollution laws.
 - 1) Do not burn or bury rubbish and waste materials on site.
 - 2) Do not dispose of volatile waste, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.

B. PRODUCTS

- 1. GENERAL
 - a. Use only cleaning materials recommended by manufacturer of surface to be cleaned and use cleaning materials only on surfaces recommended by cleaning material manufacturer.

C. EXECUTION

- 1. GENERAL
 - a. <u>During Construction</u>: Execute cleaning to ensure that the building, grounds, and public properties are maintained free from accumulation of waste and rubbish.
 - b. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
 - c. At reasonable intervals during progress of work, clean site and public properties, and dispose of waste materials, debris, and rubbish.

- d. Provide on-site containers for collection of waste materials, debris, and rubbish.
- e. Remove waste materials, debris, and rubbish from site and legally dispose of at a public or private dumping area off Owner's property.
- f. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- g. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- h. Subcontractor's not removing construction related waste materials or unused building materials in a timely fashion will be charged for the cost of their removal and be responsible for replacement of building materials as needed for the project.

2. FINAL CLEANING

- a. The subcontractor shall be responsible for final cleaning at the direction of the Contractor and as listed below.
 - 1) Employ experienced workmen, or professional cleaners for final cleaning.
 - In preparation for substantial completion or occupancy, conduct final inspection of sight exposed interior and exterior surfaces and of concealed spaces.
 - Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed surfaces; polish surfaces so designated to shine finish.
 - 4) Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
 - 5) Remove all foreign materials from site areas.
 - 6) Broom clean paved surfaces; rake clean other surfaces of grounds.
 - 7) Remove snow and ice from access to building if applicable.
 - 8) Subcontractor shall be responsible for cleaning all equipment installed.
 - 9) Maintain cleaning until project or portion thereof is occupied by Owner.

01 75 16 - STARTUP PROCEDURES

- A. GENERAL
 - 1. SCOPE
 - a. Starting Systems.
 - b. Demonstration and Instructions.
 - 2. STARTING SYSTEMS
 - a. Coordinate schedule for start-up of various equipment and systems.
 - b. Notify Architect and Owner seven days prior to start-up of each item.
 - c. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
 - d. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
 - e. Verify wiring, controls and support components for equipment are complete and tested.
 - f. Execute start-up under supervision of Contractor's personnel in accordance with manufacturers' instructions and recommendations.
 - g. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
 - h. Submit a written report that equipment or system has been properly installed and is functioning correctly.
 - 3. DEMONSTRATION AND INSTRUCTIONS
 - a. Demonstrate operations and maintenance of products to Owner's personnel at least two weeks prior to date of final inspection.
 - b. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
 - c. Utilize operation and maintenance manuals as basis for instruction.
 - 1) Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
 - d. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

- e. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- f. Video record <u>all</u> demonstrations, including questions and answers.
 1) Provide Owner with copy in DVD format.
- 4. INSTRUCTIONAL VIDEO DISCS
 - a. Submit instructional video discs as part of close-out documents.
 - b. Provide a DVD for <u>each</u> mechanical and electrical system including but not limited to air handling units and fan powered boxes, temperature control system, fire alarm system, nurse call system, overhead paging system, and as otherwise indicated in the documents wherever demonstration of equipment is required.
 - c. Label and index all demonstrations on DVD case.
 - 1) Provide comprehensive index of all DVD's in close-out binder.
 - d. A manufacturer's pre-recorded DVD may be substituted for the demonstration video.

01 77 00 - CLOSEOUT PROCEDURES

- A. GENERAL
 - 1. SUMMARY
 - a. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1) Inspection Procedures.
 - 2) Project Record Document Submittal.
 - 3) Operating Maintenance Manual Submittal.
 - 4) Submittal of Warranties.
 - 5) Final Cleaning.
 - 2. SUBSTANTIAL COMPLETION
 - a. <u>Preliminary Procedures</u>: Before requesting inspection for certification of Substantial Completion, complete the following:
 - 1) List exceptions in the request.
 - 2) In the Application for Payment which coincides with, or first follows, the date Substantial Completion is claimed, show 100% completion for the portion of the Work claimed as substantially complete.
 - a) Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b) If 100% completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 3) Advise the Construction Manager of pending insurance change-over requirements.
 - 4) Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 5) Obtain and submit releases enabling Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
 - 6) Deliver tools, spare parts, extra stock, and similar items.
 - 7) Make final change-over or permanent locks and transmit keys to Construction Manager.
 - a) Advise Owner's personnel of change-over in security provisions.
 - 8) Complete start-up testing of systems and instruction of Owner's operating and maintenance personnel.
 - 9) Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
 - b. <u>Inspection Procedures</u>: On receipt of a request for inspection, Architect will either proceed with inspection or advise Contractor of unfilled requirements. Architect will prepare certificate of substantial completion following inspection or advise Contractor of work which must be completed or corrected before the certificate will be issued.
 - 1) The Architect will repeat inspection when requested and when assured that the work has been substantially completed.
 - 2) Results of completed inspection will form the basis of requirements for final acceptance.

3. FINAL ACCEPTANCE

- a. <u>Preliminary Procedures</u>: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 - 1) Submit final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - 2) Submit an updated final statement, accounting for final additional changes to Contract Sum.
 - 3) Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of, and responsibility for corresponding elements of the Work.
 - 4) Submit consent of surety to final payment.
 - 5) Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 6) Submit final liquidated damages settlement statement.
- b. <u>Re-inspection Procedure</u>: Architect will re-inspect the Work upon receipt of notice that Work, including inspection list items from earlier inspections, has been completed, except for items whose completion has been delayed because of circumstances that are acceptable to Architect.

4. RECORD DOCUMENT SUBMITTALS

- a. <u>General</u>: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for Architect's reference during normal working hours.
- b. <u>Project Record Submittals</u>:
 - 1) One complete or Project Record Documents on separate prints shall be maintained at the Project site by the Construction Manager.
 - a) Each Contractor shall make complete and accurate entries for their respective contracted work.
 - 2) The Construction Manager shall maintain at the job site one (1) copy of all Drawings, Specifications, Addenda, approved Shop drawings, Change Orders, field order, other Contract modifications, and other approved documents submitted by the Contractor in compliance with various Sections of the Specifications.
 - 3) Each of these Project Record Documents shall be clearly marked Project Record Documents; maintained in good condition; available at all times for observation and shall not be used for construction purposes. Markup:
 - a) Significant changes made during the construction process.
 - b) Significant detail not shown in the original Contract Documents, including Change Orders.
 - c) The location of underground utilities and appurtenances. referenced to permanent surface improvements.
 - d) The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structures.

- e) When elements are placed exactly as shown on Drawings, so indicate; otherwise show change location in red ink.
- 4) Keep Project Record Documents current.
 - a) Do not permanently conceal any Work until the required information has been recorded.
- 5) At completion of the Project, these Documents shall be brought up to date and the title sheets shall be signed by the Contractors indicating that this information is true and correct.
 - a) The Construction Manager's Record Documents will then be submitted to the Architect for disposition to the Owner.
- 6) Prior to final payment and in addition to the above requirements, the respective Contractors for Earthwork, Site Utilities, Site Concrete, Building Concrete, Mechanical and Electrical Work shall update their working drawings with all changes made in his Work.
 - a) Submit one (1) complete and clean set of prints of these changed working drawings to the Construction Manager.
 - b) Each drawing sheet shall be labeled Project Record, dated, and signed by the Contractor.
- c. <u>Record Specifications</u>: Maintain one (1) complete hard copy and one (1) electronic copy (PDF) are required of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and Modifications issued in printed form during construction.
 - 1) Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 - 2) Give particular attention to substitutions, selection of options and similar information on elements which are concealed or cannot otherwise be readily discerned later by direct observation.
 - a) Note related record drawing information and Product Data.
 - 3) Upon completion of the Work, submit record Specifications to the Construction Manager for the Owner's records.
- d. <u>Record Product Data</u>: Maintain one (1) hard copy and one (1) electronic copy (PDF) of each Product Data submittal.
 - 1) Mark these documents to show significant variations in actual Work performed in comparison with information submitted.
 - 2) Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations.
 - 3) Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation.
 - 4) Note related Change Orders and mark-up of record drawings and Specifications.
 - 5) Upon completion of mark-up, submit complete set of record Product Data to the Construction Manager for Owner's records.
- e. <u>Record Sample Submitted</u>: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel, to determine which of the submitted Samples which have been maintained during progress of the Work, are to be transmitted to the Owner for record purposes. Deliver retained samples to Owner's sample storage area.

- f. <u>Maintenance Manuals</u>: Organize operating and maintenance data into suitable sets of manageable size. <u>One (1) hard copy set and one (1) electronic file (PDF)</u> <u>are required.</u>
 - 1) Bind properly indexed data in individual heavy duty 2-inch, 3-ring vinylcovered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
 - a) Emergency Instructions.
 - b) Spare Parts Listing.
 - c) Copies of Warranties.
 - d) Wiring Diagrams.
 - e) Recommended "Turn-Around" Cycles.
 - f) Inspection Procedures.
 - g) Shop Drawings and Product Data.
 - h) Fixture Lamp Schedule.
 - i) Furnish electronic file (PDF)
- B. PRODUCTS (Not Available)

C. EXECUTION

- 1. CLOSEOUT PROCEDURES
 - a. Submit operating and maintenance manuals to the Construction Manager for Owner's records.
 - <u>Operating and maintenance Instructions</u>: Arrange for each installer of equipment which requires regular maintenance to meet with the Owner's personnel to provide instruction to proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:
 - a) Maintenance Manuals.
 - b) Record Documents.
 - c) Spare Parts and Materials.
 - d) Tools.
 - e) Lubricants.
 - f) Fuels.
 - g) Identification Systems.
 - h) Control Sequences.
 - i) Hazards.
 - j) Cleaning.
 - k) Warranties and Bonds.
 - I) Maintenance Agreements and similar continuing commitments.
 - b. As part of this instruction for operating equipment, demonstrate the following procedures:
 - 1) Start-Up.
 - 2) Shut-Down.
 - 3) Emergency Operations.
 - 4) Noise and Vibration Adjustments.
 - 5) Safety Procedures.
 - 6) Economy and Efficiency Adjustments.
 - 7) Effective Energy Utilization.

2. FINAL CLEANING

a. <u>Cleaning</u>:

- 1) Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected from a normal, commercial building cleaning and maintenance program.
- b. Comply with the manufacturer's instructions.
- c. Complete the following cleaning operations before requesting the inspection for Certification of Substantial Completion.
 - 1) Remove labels which are not permanent labels.
 - 2) Clean transparent materials, including mirrors and glass in doors and windows.
 - 3) Remove glazing compound and other substances which are noticeable vision-obscuring materials.
 - 4) Replace chipped and broken glass and other damaged transparent materials.
 - 5) Clean exposed exteriors and interiors hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.
 - 6) Restore reflective surfaces to their original reflective condition.
 - 7) Leave concrete floors broom clean.
 - 8) Vacuum carpeted surfaces.
 - 9) Wipe surfaces of mechanical and electrical equipment.
 - 10) Remove excess lubrication and other substances.
 - 11) Clean plumbing fixtures to a sanitary condition.
 - 12) Clean light fixtures and lamps.
- d. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances.
 - 1) Sweep paved areas broom clean; remove stains, spills and other foreign deposits.
 - 2) Rake grounds which are neither paved nor planted, to a smooth eventextured surface.
- e. <u>Removal of Protection</u>: Remove temporary protection and facilities installed for protection of the Work during construction.
- f. <u>Compliance</u>:
 - 1) Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
 - 2) Do not burn waste materials at the site.
 - 3) Do not bury debris or excess materials on the Owner's property.
 - 4) Do not discharge volatile, harmful or dangerous materials into drainage systems.
 - 5) Remove waste materials from the site and dispose of in a lawful manner.
- g. <u>Extra Materials</u>: Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

01 78 23 - OPERATION AND MAINTENANCE DATA

A. GENERAL

1. RELATED DOCUMENTS

a. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division <u>1 GENERAL REQUIREMENTS</u> apply to this Section.

2. SUMMARY

- a. This Section specifies administrative and procedural requirements for operating and maintenance manuals including the following:
- b. Preparation and submittal of operating and maintenance manuals for building operating systems or equipment.
- c. Preparation and submittal of instruction manuals covering the care, preservation and maintenance of architectural products and finishes.
- d. Instruction of the Owner's operating personnel in operation and maintenance of building systems and equipment.
- e. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate Sections of Divisions 2 through 33.
- f. Preparation of Shop Drawings and Product Data are included in Section <u>01 33 01</u> <u>SUBMITTALS</u>
- g. General closeout requirements are included in Section <u>01 77 00 CLOSEOUT</u> <u>PROCEDURES.</u>
- h. General requirements for submittal of Project Record Documents are included in Section <u>01 77 00 CLOSEOUT PROCEDURES.</u>
- i. <u>Multiple Contracts</u>: Each Contractor shall prepare operating and maintenance data for its own installations and submit to the Construction Manager.
 - 1) Where operating and maintenance manuals include information on installations by a subcontractor the Contractor shall prepare the manuals, including collection, collation, and binding of the material and submittal of data as specified.
 - 2) Where instruction in operating and maintenance procedures on equipment and systems involves participation of more than one Contractor, the Contractor who is designated by the Architect as the principal instructor shall coordinate with the other contractors for a mutually agreeable time to provide instruction to the Owner's operating and maintenance personnel.

3. QUALITY ASSURANCE

- a. <u>Maintenance Manual Preparation</u>: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.
 - 1) Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.
 - 2) Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings or clearly in an understandable format.
- b. <u>Instructions for the Owner's Personnel</u>: For instruction of the Owner's operating and maintenance personnel, use experienced Instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involved.

4. SUBMITTALS

- a. <u>Submittal Schedule</u>: Comply with the following schedule for submittal of operating and maintenance manuals.
 - 1) Before Substantial Completion, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit two (2) draft copies of each manual to the Construction Manager for review.
 - a) Include a complete index or table of contents of each manual.
 - 2) The Construction Manager will return one (1) copy of the draft with comments within fifteen (15) working days of receipt.
 - 3) Submit one (1) copy of data in final form at least fifteen (15) working days before final inspection.
 - a) This copy will be returned within fifteen (15) working days after final inspection, with comments.
 - 4) After final inspection, make corrections or modifications to comply with the Architect and/or Construction Manager's comments.
 - a) Submit the specified number of copies of each approved manual to the Construction Manager within fifteen (15) working days.
- b. <u>Form of Submittal</u>: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel.
 - 1) Organize into suitable sets of manageable size.
 - 2) Where possible, assemble instructions for similar equipment into a single binder.
- c. <u>Binders</u>: For each manual, provide heavy-duty, commercial quality, durable 2ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8 ½" by 11" paper.
 - 1) Provide a clear plastic sleeve on the spine, to hold labels describing the contents.
 - 2) Provide pockets in the covers to receive folded sheets.
 - 3) Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the Project Manual table of contents.
 - 4) Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.

- 5) Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter covered.
- 6) Indicate the volume number for multiple volume sets of manuals.
- d. <u>Dividers</u>:
 - 1) Provide heavy paper dividers with celluloid covered tabs for each separate Section.
 - 2) Mark each tab to indicate contents.
 - 3) Provide a typed description of the product and major parts of equipment included in the Section on each divider.
- e. <u>Test Material</u>: Where written material is required as part of the manual, use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8 ½" x 11", 20-pound white bond paper.
- f. <u>Drawings</u>: Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.
 - 1) Where oversize drawings are necessary, fold the drawings to the same size as the text pages and use as a fold-out.
 - 2) If drawings are too large to be used practically as fold-out, place the drawing, neatly folded, in the front or rear pocket or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents and drawing location at the appropriate location in the manual.

5. MANUAL CONTENT

- a. In each manual include information specified in the individual Specification Section, and the following information for each major component of building equipment and its controls:
 - 1) General system or equipment description.
 - 2) Design factors and assumptions.
 - 3) Copies of applicable Shop Drawings and Product Data.
 - 4) System or equipment identification, including:
 - a) Name of manufacturer
 - b) Model number
 - c) Serial number of each component
 - 5) Operating instructions.
 - 6) Emergency instructions.
 - 7) Wiring diagrams.
 - 8) Inspection and test procedures.
 - 9) Maintenance procedures and schedules.
 - 10) Precautions against improper use and maintenance.
 - 11) Copies of warranties.
 - 12) Repair instructions including spare parts listing.
 - 13) Sources of required maintenance materials and related services.
 - 14) Manual Index.
- b. Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond, and service Contract issued.

- c. <u>Title Page</u>: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information:
 - 1) Subject matter covered by the manual
 - 2) Name and address of the project
 - 3) Date of submittal
 - 4) Name, address, and telephone number of the Contractor
 - 5) Name and address of the Architect
 - 6) Cross reference to related systems in other operating and maintenance manuals
- d. <u>Table of Contents</u>: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.
 - 1) Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.
- e. <u>General Information</u>:
 - 1) Provide a general information Section immediately following the Table of contents, listing each product included in the manual, identified by product name.
 - 2) Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor.
 - 3) Clearly delineate the extent of the responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.
- f. Product Data:
 - Where manufacturer's standard printed data is included in the manuals, include only sheets which are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation.
 - 2) Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents.
 - 3) Identify data that is applicable to the installation and delete references to information that is not applicable.
- g. <u>Written Text</u>:
 - 1) Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information.
 - 2) Organize the text in a consistent format under separate headings for different procedures.
 - 3) Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.
- h. Drawings:
 - 1) Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams.
 - 2) Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.

- 3) Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.
- i. <u>Warranties, Bonds, and Service Contracts</u>:
 - 1) Provide a copy of each warranty, bond, or service contract in the appropriate manual for the information of the Owner's operating personnel.
 - 2) Provide written data outlining procedures to be followed in the event of product failure.
 - 3) List circumstances and conditions which would affect validity of the warranty or bond.
- 6. MATERIAL AND FINISHES MAINTENANCE MANUAL
 - a. Submit one (1) hard copy and one (1) electronic file (PDF) of each manual, in final form, on material and finishes to the Construction Manager for distribution.
 - b. Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture-protection and products exposed to the weather.
 - c. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.
 - d. <u>Architectural Products</u>: Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.
 - e. <u>Manufacturer's Data</u>: Provide complete information on architectural products, including the following, as applicable:
 - 1) Manufacturer's catalog number
 - 2) Size
 - 3) Material composition
 - 4) Color
 - 5) Texture
 - f. Reordering information for specially manufactured products.
 - g. <u>Care and Maintenance Instructions</u>:
 - 1) Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning.
 - 2) Provide information regarding cleaning agents and methods which could prove detrimental to the product.
 - 3) Include manufacturer' recommended schedule for cleaning and maintenance.
 - h. <u>Moisture-Protection and Weather-Exposed Products</u>: Provide complete manufacturer's data with instructions on inspection, maintenance, and repair of products exposed to the weather or designed for moisture-protection purposes.
 - i. <u>Manufacturer's Data</u>: Provide manufacturer's data giving detailed information, including the following, as applicable:
 - 1) Applicable standards
 - 2) Chemical composition

- 3) Installation details
- 4) Inspection procedures
- 5) Maintenance information
- 6) Repair procedures

7. EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

- a. Submit one (1) hard copy and one (1) electronic file (PDF) of each completed manual on equipment and systems, in final form, to the Construction Manager for distribution.
- b. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.
- c. Refer to Specification Sections for additional requirements on operating and maintenance of the various pieces of equipment and operating systems.
- d. <u>Equipment and Systems</u>: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.
- e. <u>Description</u>: Provide a complete description of each unit and related component parts, including the following:
 - 1) Equipment or System Function
 - 2) Operating Characteristics
 - 3) Limiting Conditions
 - 4) Performance Curves
 - 5) Engineering Data and Tests
 - 6) Complete Nomenclature and Number of Replacement Parts
- f. <u>Manufacturer's Information</u>: For each manufacturer of a component part or piece of equipment, provide the following:
 - 1) Printed Operating and Maintenance Instructions
 - 2) Assembly Drawings and Diagrams required for maintenance
 - 3) List of items recommended to be stocked as spare parts
- g. <u>Maintenance Procedures</u>: Provide information detailing essential maintenance procedures, including the following:
 - 1) Routine Operations
 - 2) Trouble-Shooting Guide
 - 3) Disassembly, Repair and Re-assembly
 - 4) Alignment, Adjusting, and Checking
- h. <u>Operating Procedures</u>: Provide information on equipment and system operating procedures, including the following:
 - 1) Start-Up Procedures
 - 2) Equipment or System Break-In
 - 3) Routine and Normal Operating Instructions
 - 4) Regulation and Control Procedures
 - 5) Instructions on Stopping
 - 6) Shut-Down and Emergency Instructions
 - 7) Summer and Winter Operating Instructions
 - 8) Required Sequences for Electric or Electronic Systems
 - 9) Special Operating Instructions

- i. <u>Servicing Schedule</u>: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.
- j. <u>Controls</u>: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.
- k. <u>Coordination Drawings</u>: Provide each Contractor's Coordination Drawings.
- I. Provide as installed color-coded piping diagrams, where required for identification.
- m. <u>Valve Tags</u>: Provide charts of valve tag numbers, with the location and function of each valve.
- n. <u>Circuit Directories</u>: For electric and electronic systems, provide complete typed circuit directories of panel boards, including the following:
 - 1) Electric service
 - 2) Controls
 - 3) Communication

8. INSTRUCTIONS OF THE OWNER'S PERSONNEL

- a. Prior to final inspection, instruct the Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 - 1) Provide instruction at mutually agreed upon time.
- b. For equipment which requires seasonal operations, provide similar instruction during other seasons.
- c. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction.
 - 1) Review contents in detail to explain all aspects of operation and maintenance.
- B. PRODUCTS (Not Applicable)
- C. EXECUTION (Not Applicable)

SECTION 01 78 36 - WARRANTIES AND BONDS

A. GENERAL

- 1. DEFINITIONS
 - a. <u>Standard Product Warranties:</u> are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
 - b. <u>Special Warranties:</u> are written warranties required by or incorporated in Contract documents, to extend time limits provided by standard warranties or to provide greater rights for the Owner.
 - 1) Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - Requirements for warranties for products and installations which are specified to be warranted, are included in the individual Sections of Divisions <u>2 SITEWORK</u> through <u>33 UTILITIES</u> and drawings.
 - c. <u>Disclaimers and Limitations</u>: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty of the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.
 - d. <u>Related Damages and Losses</u>: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
 - e. <u>Reinstatement of Warranty:</u> When Work covered by a warranty has failed and been corrected, reinstate the warranty by written endorsement.
 - 1) The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
 - f. <u>Replacement Cost</u>: On determination that Work covered by a warranty has failed replace or rebuild the Work to an acceptable condition complying with requirements of Contract documents.
 - 1) The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through part of its useful service life.
 - g. <u>Owner's Recourse</u>: Written warranties made to the Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - h. <u>Rejection of Warranties</u>: The Owner reserves the right to reject warranties and limit selections to products with warranties not in conflict with requirements of the Contract Documents.
 - 1) The Owner reserves the right to refuse to accept Work where a special warranty, or similar commitment is required, until evidence is presented that entities required to countersign commitments are willing to do so.

- i. <u>Submit Written Warranties</u>: to the Construction Manager prior to the date certified for Substantial Completion.
 - 1) If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties on the Construction Manager's request.
 - 2) When a designated portion of the Work is completed and occupied or used, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the Work.
- j. <u>Special Warranties</u>: When a special warranty is to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties.
 - 1) Submit a draft to the Owner through the Construction Manager for approval prior to final execution.
 - a) Refer to individual Sections of Divisions <u>2 SITEWORK</u> through <u>4</u> <u>CONCRETE</u> and drawings for specific content, and particular requirements for submittal of special warranties.
- k. <u>Warranty Binders</u>: Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½" by 11" paper.
 - 1) Provide heavy paper dividers with celluloid covered tabs for each warranty.
 - 2) Mark the tab to identify the product or installation.
 - 3) Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
 - 4) Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
 - 5) When operating and maintenance manuals are required for warranted construction, provide additional copies of each warranty, as necessary, for inclusion in each required manual.

02 00 00 - SITE PREPARATION

A. GENERAL

- 1. Drawings and general provisions of the Contract, including Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1</u> <u>GENERAL REQUIREMENTS</u> apply to this Section.
- 2. SUMMARY
 - a. <u>This Section includes the following</u>:
 - 1) Protecting existing trees to remain.
 - 2) Removing existing trees, stumps, vegetation and grass.
 - 3) Clearing and grubbing.
 - 4) Stripping and stockpiling topsoil.
 - 5) Removal of above-grade and below-grade improvements.
 - 6) Removal of existing pavements, curbs and walks including aggregate subbase materials.
 - 7) Protection and pruning of existing trees to remain.
 - b. <u>Related Sections include the following</u>:
 - 1) Section <u>31 00 00 EARTHWORK</u> for soil materials, excavating, backfilling, and site grading.
 - Section <u>31 25 00 EROSION AND SEDIMENT CONTROL</u> for erosion and sediment control measures.

3. DEFINITIONS

- a. <u>Topsoil</u>: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2" in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- b. <u>Tree-Protection Zone</u>: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line.
- 4. MATERIAL OWNERSHIP
 - a. Except for suitable topsoil and suitable soils for reuse in the project, all cleared and demolition materials shall become Contractor's property and shall be removed from Project site.
- 5. QUALITY ASSURANCE
 - a. <u>Pre-installation Conference</u>: Conduct conference at Project site to comply with requirements in Section <u>01 31 13 PROJECT COORDINATION.</u>
- 6. SUBMITTALS
 - a. <u>Qualification Data</u>: For qualified arborist and tree service firm.
- b. <u>Certification</u>: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- c. <u>Maintenance Recommendations</u>: From arborist, for care and protection of trees affected by construction during and after completing the Work.

7. PROJECT CONDITIONS

- a. <u>Traffic</u>: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1) Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- b. <u>Utility Locator Service</u>: Notify utility locator service for area where Project is located before site clearing.
- c. Do not commence site clearing operations until erosion and sedimentation control measures are in place.

8. PROJECT PRACTICES

- a. <u>The following practices are prohibited within Tree Protection Zones:</u>
 - 1) Storage of construction materials, debris, or excavated material.
 - 2) Parking vehicles or equipment.
 - 3) Foot traffic.
 - 4) Erection of sheds or structures.
 - 5) Impoundment of water.
 - 6) Excavation or other digging unless otherwise indicated.
 - 7) Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. PRODUCTS

- 1. TREE PROTECTION ZONE FENCING
 - a. Fence shall be chain link fabric, 11 gauge minimum, 4' minimum height, 2" diameter posts at 8' o.c.
 - b. Fencing may be new or used fencing in good condition.

C. EXECUTION

- 1. PREPARATION
 - a. Protect and maintain survey benchmarks/control points from disturbance during construction.
 - b. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition,
- 2. TREE PROTECTION ZONES

- a. Install protection-zone fencing along edges of protection zones [before materials or equipment are brought on the site and construction operations begin.
 - 1) Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
- b. Maintain protection zones free of weeds and trash.
- c. Maintain protection-zone fencing in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3. TREE PRUNING

- a. Prune existing trees noted to remain.
 - 1) Remove broken and damaged branches.
 - 2) Prune tree to clean and thin to proper horticultural shape and form.
- b. <u>Pruning Standards</u>: Prune trees according to ANSI A300.
- c. Cut branches with sharp pruning instruments; do not break or chop.
- d. Do not apply pruning paint to wounds.
- 4. UTILITIES
 - a. <u>Existing Utilities</u>: Do not interrupt existing utilities serving adjacent facilities or others unless permitted in writing and then only after arranging to provide temporary utility services according to requirements indicated.
- 5. CLEARING AND GRUBBING
 - a. Remove obstructions and vegetation to permit installation of new construction. Do not remove trees, shrubs, and other vegetation indicated to remain
 - b. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1) Place fill material in horizontal layers not exceeding a loose depth of 8" and compact each layer to a density equal to adjacent original ground.

6. TOPSOIL STRIPPING

- a. Remove vegetation and grass before stripping topsoil.
- b. Strip topsoil to whatever depths are encountered, in a manner to prevent intermingling with underlying subsoil or other waste materials.
- c. All topsoil and vegetation to be removed from within the footprint of the proposed building addition and pavement areas, and to a minimum of 5' beyond to the limits of the proposed construction.
- d. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

- e. Stockpile topsoil materials in stockpile area located on-site as directed.
- f. Protect stockpiles from erosion control as required.
- 7. FIELD QUALITY CONTROL
 - a. <u>Inspections</u>: Engage a qualified arborist to direct tree-protection measures and tree pruning work and to prepare inspection reports.
- 8. SITE IMPROVEMENTS
 - a. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
 - b. Remove curbs and sidewalks with public right-of-ways as indicated.
 - c. Work shall be in accordance with City of South Bend standards.
- 9. DISPOSAL
 - a. <u>Disposal</u>: Remove unsuitable soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

02 30 00 - SOILS INVESTIGATION

A. GENERAL

- 1. This Section describes soils investigation at the site and use of data resulting from that investigation.
- 2. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 GENERAL REQUIREMENTS, apply to this Section.

3. SOILS INVESTIGATION REPORTS

- a. <u>General</u>: A soils investigation report has been prepared for the site of this Work by the soil investigation engineer Weaver Consultants Group dated July 29, 2020.
 - 1) The soils investigation report has been included in the Project Manual for bidder's information.
 - <u>Use of Data</u>: This report was obtained only for the Architect's use in design. The report is available for bidder's information, and is not a warranty of subsurface conditions
 - 3) Bidders should visit the site and acquaint themselves with existing conditions.
 - 4) Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such investigations may be performed only under time schedules and arrangements approved in advance by the Owner.

4. QUALITY ASSURANCE

- a. A construction geotechnical soil engineer shall be retained by Owner to observe performance of work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests. Contractor shall be responsible to coordinate services of geotechnical soil engineer with earthwork operations.
- b. Contractor shall readjust work performed that does not meet technical or design requirements but make no deviation from the Contract Documents without specific and written approval from the Architect.

END OF SECTION

July 29, 2020 Project No. 3990-354-19-00

ALLIANCE ARCHITECTS

PRELIMINARY GEOTECHNICAL EXPLORATION MULTI-FAMILY RESIDENTIAL FACILITY

HOPE AVENUE SOUTH BEND, INDIANA

> Prepared For: Alliance Architects 929 Lincolnway East, Suite 200 South Bend, IN 46601

PREPARED BY





July 29, 2020 Project No. 3990-354-19-00

Mr. William R. Laime, AIA Alliance Architects 929 Lincoln Way East, Suite 200 South Bend, IN 46601

Re: Preliminary Geotechnical Evaluation Multi-Family Residential Facility Hope Avenue South Bend, Indiana

Dear Mr. Laime:

In compliance with your request, **Weaver Consultants Group**, **LLC** (WCG) has completed the preliminary geotechnical evaluation at the site of the above-referenced project. The purpose of this study was to explore the stratification and engineering properties of the subsurface soils and to provide recommendations for foundations of the proposed multi-family residential buildings and parking lot/drives.

In the body of this report, we present a summary of our findings, an interpretation of the subsurface conditions, our design recommendations, and construction considerations. The soil boring logs are presented in the **Boring Logs Appendix**. The methods for field and laboratory operations are presented in the **Field Exploration Appendix**. General Qualifications and Contractual Considerations are presented in the **Qualifications Appendix**.

Thank you for selecting our firm to assist with this phase of the project. Please call us if there are any questions concerning this report.

Sincerely,

Weaver Consultants Group, LLC

Sumeth P. Miller

Kenneth P. Miller, P.E. Senior Project Director



Then Sk

Stephen Schubert, P.E. Geotechnical Engineering Manager

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Qualifications Appendix

General Qualifications and Contractual Considerations

1 EXECUTIVE SUMMARY

We understand that the South Bend Heritage Foundation is planning the development of a new multi-family residential facility located north of Hope Avenue just west of Patty Lane in South Bend, Indiana. Details of the facility such as the number of buildings, building type and foundation loads are not known at this time. In addition to the buildings, the project is also planned to have paved access roads and parking facilities. Management of storm water runoff is also not known.

In summary, the soil borings performed for the proposed design and construction of the facility indicate that the site soils generally consist of a relatively thin layer silty sand topsoil overlying granular soils to the maximum depth explored. The relative density of the granular soils' ranges from loose to medium dense, generally improving with depth. Groundwater was encountered at depths ranging from 10½ to 12 feet below the existing ground surface.

In our opinion, the proposed buildings can be supported on shallow spread footings bearing on a compacted/densified sand subgrade. We recommend the foundations be designed for a net allowable soil bearing pressure of 3,000 pounds per square foot (psf).

Typical pavement construction is anticipated based on the pavement section being supported on the compacted near surface soils or structural fill placed across the site.

Given that the soils are highly permeable, construction of a storm water storage and infiltration system are anticipated to be suitable for managing runoff.

A detailed discussion of design parameters and construction considerations is included in subsequent sections of this report.

2.1 Project Description and Location

We understand that the South Bend Heritage Foundation is planning the development of a new multi-family residential facility located north of Hope Avenue just west of Patty Lane in South Bend, Indiana. Details of the facility such as the number of buildings, building type (with or without basements) and foundation loads are not known at this time. In addition to the buildings, the project is also planned to have paved access roads and parking facilities. Management of storm water runoff is also not known. The location of the site is provided on a Site Location Plan **(Figure 1)** in the Appendices.

For design of the proposed facility, a subsurface exploration program consisting of five 15-foot deep borings was performed. The number, location and depth of the soil borings were chosen by Alliance Architects (AA) in conjunction with Weaver Consultants Group (WCG). The borings were located in the field by a representative of WCG referencing existing site features shown on a plan provided by AA on July 17, 2020. The approximate locations of the borings are provided on the Boring Location Plan **(Figure 2)** in the Appendices.

2.2 Site Description

The project site is located on an approximately 2.2-acre site that is situated north of Hope Avenue immediately west of Patty Lane in South Bend, Indiana. Based on available information, the site has not been previously occupied by structures. From historical photographs, it appears there was some grading type activities on the site. The nature of those activities is unknown. At the time of our field activities, the site was relatively flat, and grass covered. Several trees and bushes were located in the southwest corner and along the west side of the property. No other distinctive features were noted about the property.

3 SUBSURFACE CONDITIONS

3.1 Subsurface Conditions

Our interpretation of the subsurface conditions is based on five soil borings that extended to a depth of 15 feet below the existing ground surface. The following discussion is general; for more specific information, refer to the boring logs presented in the **Boring Logs Appendix**.

Surface conditions: Currently, the site surface is a vacant property with overgrown grass/weeds and a small number of trees. Topsoil at the boring locations ranged from about 1½ to 2 feet thick.

Subsurface Conditions: In general, below the surficial topsoil, the subsurface soil profile consisted of granular-type soil encountered to the terminal depth of the soil borings. The granular soil conditions (below the topsoil) can be subdivided into three somewhat distinct soil layers based on classification: fine sand with silt (SP-SM); fine to coarse sand (SP) and fine to coarse sand with clay (SP-SC); and fine to coarse sand (SP). The underlying soil layers in the borings are described in more detail below.

- Fine Sand with silt (SP-SM) The near surface soils below the surface topsoil consist of a 3 to 5-foot-thick layer of fine sand containing a moderate amount of silt (SP-SM). The relative density of the sand was loose to medium dense with Standard Penetration Test (SPT) N-values ranging from 9 to 24 blows per foot (bpf).
- Fine to Coarse Sand (SP) and Fine to Coarse Sand with Clay (SP-SC) Below the fine sand with silt, the granular soils near surface soils, the underlying soil was comprised mainly of poorly-graded sand (SP) in the fine and fine to medium sized ranges. The relative density of the sand was loose medium dense with SPT N-values ranging from 4 to 10 bpf.
- Fine to Coarse Sand, little gravel (SP) Below a depth of about 12 feet, the gravel content of the soil increased within some zones. The relative density of the sand was loose to medium dense with SPT N-values ranging from 6 to 16 bpf.

3.2 Groundwater Conditions

Groundwater level observations noted during and after completion of the drilling operations are recorded on the boring logs. During the subsurface exploration, activities, groundwater was observed at depths ranging from 10½ to 12 feet below the existing ground surface. Granular soil deposits are relatively pervious, and water can drain into the borehole somewhat quickly and come to an equilibrium position. Therefore, it is our opinion that these observations represent the groundwater condition at the time of our field activities. However, fluctuations in the water table should be anticipated throughout the year with variations in precipitation and other

environmental or physical factors. Seasonal fluctuations in the groundwater level should be expected due to variations in precipitation, evaporation and surface water runoff.

4.1 Basis

Our recommendations for the proposed site development are based on data presented in this report, which includes five widely spaced soil borings widely dispersed across the southern twothirds of the property. Subsurface variations can exist at a site which may not be indicated by such a dispersed and limited boring program. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected. No unusual settlement restrictions have been specified for the structure.

4.2 Building Foundations

Given the conceptual nature of the project at this time, our recommendations are considered preliminary. Once more details of the project are developed, we recommend the WCG be provided the opportunity to review the plans and confirm or recommendations. In our opinion, the subsurface conditions are generally suitable for support a two-story structures supported on shallow spread footings and continuous wall footings provided the foundations are constructed in accordance with the recommendations that are discussed in **Section 5** of this report. Groundwater is not anticipated to be encountered for construction of slab on grade structures. Following removal of the surface vegetation, topsoil, and tree root bulbs, we recommend that subgrade be densified using large, self-propelled vibratory compactors. Where root bulbs exist and are removed, we recommend they be backfilled with structural fill (defined in **Section 5.3** below).

A program of soil compaction is recommended to densify the foundation soils, identify any soft or yielding areas, and provide a uniform bearing surface. For this, we recommend a compaction program as described in **Section 5.2** below. We recommend that the geotechnical engineer observe the foundation subgrade conditions during the improvement process to confirm the anticipated conditions.

If the subgrades are prepared as discussed above, we recommend that the foundations be proportioned using a net allowable soil bearing pressure not exceeding 3,000 pounds per square foot (psf). The above bearing pressure value is that pressure which may be transmitted to the foundation soil in excess of the final minimum surrounding overburden pressure and may be increased by one-third when considering short-term wind or seismic loading conditions. Settlement of foundations in the very loose to loose sand is anticipated to be limited and occur rather immediately (i.e., during construction). Based on these recommendations, total and differential settlements of the building are not anticipated to exceed 1 in. and ½ in., respectively.

We recommend that wall and column footings should be at least 18 inches wide and 30 inches wide, respectively. In order to provide adequate protection against frost heave of the foundations, we recommend locating perimeter footings in heated areas of the structure at a depth of at least 42 inches below finished exterior grade.

4.3 Floor Slab

We understand that a slab-on-grade Portland cement concrete floor system established near the existing ground level is planned. To provide uniform bearing and minimize the movement of soil moisture into the slab, we also recommend that the upper 4 in. of soil immediately below the floor slab consist of a clean, free-draining granular material. In our opinion, relatively clean, free-draining granular soil should contain no more than 5 percent fines, by dry weight, passing a No. 200 U.S. Standard sieve and have an effective size (D₁₀) greater than 0.25 mm. The near surface soils do not meet the free-draining criteria. We also recommend using a modulus of subgrade reaction of 100 pounds per cubic inch (pci) for design of the floor slab.

Based on the soil borings, groundwater was encountered at depths of 10½ to 12 feet below the existing ground surface. Intrusion of subgrade moisture through the floor slab can occur through fluid or vapor phase as the result of hydraulic, thermal, or humidity gradients. To reduce the impact of this subsurface moisture and the potential from other moisture sources, a common practice is to place a vapor barrier under the slab. This is particularly true where moisture sensitive floor coverings are anticipated. Depending on the details of the vapor barrier design, the system may not be completely effective in preventing floor slab moisture problems.

It must be understood that factors other than a vapor barrier can significantly influence flooring problems. These other factors include quality of concrete, interior ventilation, type of flooring adhesive, concrete curing time, and sources of moisture from plumbing leaks, landscaping or surface drainage. It is emphasized that we are not floor moisture proofing experts. The building designers should consider all available measures for slab moisture protection. We recommend consulting with the floor covering manufacturer, installer or their consultant prior to installation of the floor coverings regarding the most appropriate methods for controlling subgrade moisture intrusion.

The slab should be supported on a relatively clean, free-draining granular base course, bearing on a suitably prepared subgrade (refer to **Section 5.1**).

4.3 Seismic

A soil profile coefficient is required for the estimation of minimum earthquake design forces. The coefficient is a function of soil type (i.e., depth of soil and strata types) and depth to bedrock. Although the depth to bedrock was not confirmed by the boring program, published geological information and our experience in the area indicates that it is likely to be on the order of 150 to 200 feet below the existing ground surface. Based on the descriptions in Chapter 20 of ASCE 7

and our general knowledge of geological conditions in the locale, in our opinion, the soil conditions at this site most closely resemble the site classification D.

4.4 Pavement Recommendations

4.4.1 General

Our recommendations are based on the assumption that the paved areas will be constructed on structural fill placed to raise the site grades. Our recommendations for asphaltic concrete and Portland cement concrete are presented in **Sections 4.4.2** and **4.4.3**, respectively.

4.4.2 Asphaltic Concrete Pavement Recommendations

Serviceable pavements can be achieved by different combinations of materials and thicknesses, varied to provide roughly equivalent strengths. Local practice for existing pavement construction could be reviewed for other blends, or combinations of materials that have been found satisfactory, and for applicable minimum standards. For pavements at this site, we provide the following guidelines. These guidelines have been developed from the results of our geotechnical exploration using an assumed medium traffic loading (considerable in-out movement, trucks in designated areas only) and an assumed California Bearing Ratio (CBR) value of 8 (this is a typical value for the densified sand (SP or SP-SM) or structural fill anticipated to be used as fill to raise the site grades). Please note that the thicknesses listed below refer to compacted thicknesses.

Table 1 – Asphalt Pavement Recommendations

-	
Light Duty Pavement – Pas	senger Car Traffic Only
Asphalt Surface Course	1.5 inches
Asphalt Binder Course	2.5 inches
Aggregate Base Course	6 inches
Heavy Duty Pavement – Passeng	ger and Truck Vehicle Traffic
Asphalt Surface Course	2.0 inches
Asphalt Binder Course	4.0 inches
Aggregate Base Course	8 inches

We recommend that the base course consist of a dense-graded, crushed aggregate material, such as No. 53 coarse aggregate. The gradation of this material is described in the Indiana Department

of Transportation (INDOT) standard specifications Section 904.03. In our opinion, crushed aggregate material, such as gravel, limestone or crushed concrete are acceptable base course materials as long as they approximate the recommended INDOT gradations and are approved by the design engineer/architect. The base course should be compacted to no less than 98 percent of its maximum standard Proctor density, or its equivalent relative density. Further, suitable primer and tack coats should be placed between the base course and between the overlying asphalt layers. In addition, all asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and the INDOT specifications.

Structural fill placed beneath the pavement sections should be compacted to at least 95 percent of the maximum standard Proctor dry density (ASTM D698) to within 2 feet of the bottom of the aggregate base course. The base course material should likewise be compacted to no less than 98 percent of its maximum standard Proctor dry density. Additionally, structural fill placed in the top 3½ feet should not be frost susceptible. Frost susceptible soils are those soils having an effective size (D₁₀) of 0.25 mm or greater. The near-surface soils encountered are not anticipated to meet this criteria. Therefore, consideration should be given to the pavement drains suitable for draining the pavement subgrade.

Although we do not anticipate problems due to the high groundwater table underlying the site since the proposed asphalt areas are generally expected to be located more than 5 feet above the current groundwater levels, we recommend that the pavement and aggregate base course be properly graded and sufficiently high above any adjacent drainage ponds or swales to provide for positive pavement surface and base drainage.

The procedures we have used to develop our pavement guidelines are consistent with generally accepted engineering practice and are intended to provide a 20-year life span. However, based upon our past experience, we have found that proper construction techniques, quality of drainage, pavement maintenance and actual traffic loads are the major factors in determining pavement life and performance. It is important that experienced technical personnel observe construction activities to check that the pavement layers are constructed as designed.

4.5 Storm Water Detention

No details for storm water runoff was provided. We anticipate that some type of storage/infiltration system will be planned for runoff. We anticipate that whatever method is used, the base of the facility will be established below the fine sand with silt (SP-SC) stratum. Based on this assumption, the soil at the base of the planned drainage structure is anticipated to consist of loose fine to coarse sand (SP) or loose fine to coarse sand with silt (SP-SM). Grain size analyses were performed on two samples collected at the borings at depths of about 6 to 7½ feet and one at 8½ to 10 feet below the existing ground surface. The infiltration rate of the sand was estimated using the Hazen formula, which is based on correlations to the grain size

distribution of granular soils. The estimated infiltration rates based on the Hazen Formula are presented in Table 2.

Location	Depth (ft.)	Infiltration Rate (in./hr.)	Factor of Safety	Design Rate (in./hr.)	Soil Classification (USCS)
B-1	6 - 7½	104	3	34	Poorly Graded Fine to Coarse SAND (SP)
B-4	8½ - 10	121	3	40	Poorly Graded Fine to Coarse SAND (SP)

Table 2 – Summary of Infiltration Estimates

Based on the results of our laboratory analysis, the fine to coarse sands can be considered to have a design infiltration in excess of that allowed by the city of South Bend. We recommend using the maximum allowable infiltration rate. This estimate is based on data from a sample taken within the planned infiltration structure area.

The soil excavated from the storm water management area could be considered as on-site fill for use as described in the previous sections. Given the fine grained nature of the sand, this soil is considered to be frost susceptible.

5.1 Site Preparation

All structural areas plus, where feasible, a minimum lateral margin of 10 feet beyond the perimeter of the proposed construction should be initially prepared by stripping/removing and grubbing the vegetation, topsoil, and other unsuitable materials. Following the stripping/removal activities, the exposed surface should be densified and observed by the Geotechnical Engineer or his representative.

After successful preparation of the subgrade soils, placement of the structural fill may then proceed as necessary, to establish design grades. Where fill is required in the proposed building areas, we recommend that it consist of granular structural fill. The structural fill should meet the requirements of **Section 5.3** and be placed in accordance with **Section 5.4**.

5.2 Foundation Excavations

Foundation Excavations should be sloped, shielded or shored in accordance with the current Occupational Safety and Health Administration (OSHA) requirements (see **Section 5.7**). Once the foundation subgrade level is reached, the exposed sandy subgrade soils should first be compacted and then tested to determine that a minimum density equivalent to 98 percent of the standard Proctor density (ASTM D698) exists to a depth of 2 feet below the foundation subgrade. For densification of the foundation subgrades, we recommend the bottom of the footing excavation be compacted with high-energy jumping jack type compactor to achieve the specified minimum field density. Where structural fill is required under foundations, it should extend laterally beyond all edges of the footings at least 6 inches for every 12 inches of undercut or fill depth required below the base of the foundation.

5.3 Structural Fill

Structural fill, defined as any fill which will support structural loads, should be free of organic material, have a plasticity index of less than 25 percent, a maximum particle size of no more than 3 in., and a maximum dry density in excess of 100 pounds per cubic foot (pcf), as determined by the standard Proctor compaction test (ASTM D698). In addition, structural fill should not be frost susceptible. The structural fill should be compacted to at least 98 percent of its maximum standard Proctor dry density (ASTM D698) under the foundations.

5.4 Fill Placement Control

To achieve the recommended compaction of structural fill, we suggest that the fill be placed and compacted in layers not exceeding 8 inches in loose lift thickness. To observe compliance with the recommended density standards, we recommend that in-place density tests be performed at a frequency of at least one test for every 2,500 square feet of fill area per each lift of compacted

mass fill placed in the proposed construction areas. Where smaller areas of fill are required, we recommend a minimum of three tests for each area (e.g., for each building unit interior foundation backfill that supports floor slabs).

5.5 Construction Observations

We recommend that all footing subgrades be observed by a qualified Geotechnical Engineer or his representative prior to placement of any reinforcing steel and concrete materials. These observations are to evaluate that the exposed soils are consistent with those encountered in the borings and to check that the foundation materials are of uniform consistency and adequate density.

5.6 Groundwater Concerns

Groundwater was encountered at a depth of about 10½ to 12 feet below the existing ground surface, therefore, dewatering is not anticipated to be required for foundation excavations and foundation subgrade preparation.

5.7 Excavation Slope Stability

Our exploration did not include a detailed analysis of slope stability for any temporary excavation condition. Based on the soil conditions encountered at the boring locations, temporary shallow construction excavations are expected to expose primarily sandy soils. For such conditions, it is our opinion that shallow temporary excavations can be cut with side slopes of 1.5H: 1V. However, current OSHA standards must be met and may be more restrictive. Hence, if safe side slopes cannot be maintained due to loose granular soil conditions, then the excavation sides should be flattened, shielded or shored in accordance with current OSHA standards. The Contractor is solely responsible for constructing and maintaining stable excavations. Additionally, soil should not be stockpiled immediately adjacent to the top of the excavation.

5.8 Limitations

WCG has prepared this report in accordance with generally accepted geotechnical engineering practices to aid in the evaluation of the site subsurface soils. No other warranty, expressed or implied, is made.

The scope of this report is limited to the specific project and location described herein, and our description of this project represents our understanding of the project. The geotechnical engineering analysis and foundation recommendations presented herein were developed based on the information obtained during the subsurface investigation. It should be noted that the borehole data reflects the subsurface conditions only at the specific locations designated on the borehole logs, and that soil and groundwater conditions could vary widely throughout the site. If variations do appear during construction activities, it may become necessary to re-evaluate the recommendations of this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of any additional service, please do not hesitate to contact us.

APPENDICIES

FIGURES



		B1 →		
		B-4 ↓B-5 ↓B-5		
	B-X s	Fope Ave good for the formation of the f	PPROXIMATE GRAPHIC SCALE	120
			1 inch = 60 ft	
COP	YRIGHT © 2020 WEAVER CONSULTANT	'S GROUP. ALL RIGHTS RESERVED.	1 incn = 60 ft.	1
	PREPARED FOR:	BORING LOCATION PLAN	Weaver	DRAWN BY: SAS
	ALLIANCE ARCHITECTS		Consultants	DATE: 07/23/2020
		SOUTH BEND, IN	Group	FILE: 3990-354-19-00
		REUSE OF DOCUMENTS THIS DOCUMENT, AND THE DESIGNS INCORPORATED HERRIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF MEALER CONFULTANCE CONFULTANCE CONFUSION AND IS NOT TO BE LICED AND INFORMATION OF THE DESIGNS INTO A DESIGNSI DESIGNS INTO A DESIGNS INTO A DES	GRANGER. INDIANA	CAD: Boring Location Plan.dv
1		AUTHORIZATION OF WEAVER CONSULTANTS GROUP.	(574) 271-3447 www.wcgrp.com	

BORING LOGS

	Weaver Consultants Group 7121 Grape Road, Granger, IN 46530 574-271-3447(Phone)/574-271-3343(Fax)						LOG OF SOIL BORING NO.: <u>B-1</u> Location: See Figure 2 in Figures Appendix File No.: <u>3990-354-19-00</u> Sheet 1 of 1							
<u></u> 	WATER LEVEL DATA NE = Not Encountered Started: 7/22/2020 11.5 ft While Drilling ▼ Engineer: K. Miller 11.5 ft At Completion** ♀ Driller: D. Cichoracki ft AtDays A.D.*** Drilling Method: HSA (4¼" I.D.)					PROJECT: <u>Multi-Family Residential Facility</u> Hope Avenue South Bend, Indiana 46615 t CLIENT: <u>Alliance Architects</u> 929 Lincolnway East, Suite 200 South Bend, Indiana 46601								
Depth (ft)	DATUM: SURFA	ACE ELEVATION (ft): DN, CLASSIFICATION HTO GROUP SYMBOL	Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#)= "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)		
	Moist, dark brown, SII Moist, dark brown, SII Medium dense, moist SAND with SILT, trace Loose, moist, brown,	LTY SAND (Topsoil: SM) , reddish brown, FINE e gravel (SP-SM) FINE SAND (SP)	- 1.5 - 3.0			1	3/4/9 (13)					-		
- 4 -			5.5			2	2/3/4 (7)					- - -		
	Loose, moist, brown, with silt, trace gravel (FINE TO MEDIUM SAND (SP)				3	4/4/4 (8)					-		
- - - 10						4	4/4/4 (8)					-		
- 12	Medium dense, browr SAND, trace gravel (S	n, wet, FINE TO MEDIUM SP)	_ 11.5	X		5	3/3/5 (8)				**C.I. = 12 feet at completion	-		
	Boring Terminated at	15 ft	_ 15.0	X		6	3/6/9 (15)					-		
16 16 16 18 18 18														
NO 1 2220-2	TES: TES: 1. Weather: Cloudy, 72-77°F 2. Used safety hammer 3. Backfilled with auger cuttings		<u> </u>			= Au = Ge = Gr	iger (oprobe ab Sample	=	<u>LEC</u> = No = = Cor = She	<u>JEND</u> Recover e Sampl lby Tube	ry $$ = Split-Spoon e $$ = Vane Shear ' e	Sample Test		

Weaver Consultants Group 7121 Grape Road, Granger, IN 46530 574-271-3447(Phone)/574-271-3343(Fax)						LOG OF SOIL BORING NO.: <u>B-2</u> Location: See Figure 2 in Figures Appendix File No.: <u>3990-354-19-00</u> Sheet 1 of 1							
<u></u> 	WATER LEVEL DATA NE = Not Encountered Started: 7/22/2020 11.5 ft While Drilling ✓ 11.5 ft At Completion** ♀ Driller: ft At Days A.D.*** Drilling Method:					PROJECT: <u>Multi-Family Residential Facility</u> Hope Avenue South Bend, Indiana 46615 CLIENT: <u>Alliance Architects</u> 929 Lincolnway East, Suite 200 South Bend, Indiana 46601							
Depth (ft)	DATUM: SURFACE EL Image: Solid Description, CLA and USCS or AASHTO GREE	EVATION (ft): SSIFICATION OUP SYMBOL	Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#)= "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)	
	Moist, dark brown, SILTY SAN	ID (Topsoil: SM)	1.1			1	5/5/5 (10)					- - - -	
- -4 - -	Loose, moist, brown, FINE TC with CLAY, trace gravel (SP-S	MEDIUM SAND C)	4.0	X		2	3/3/5 (8)					- - -	
6 				X		3	4/3/3 (6)					- - -	
- - - - 10	Loose, moist, brown, FINE TC some gravel (SP)	MEDIUM SAND,	9.5			4	2/2/2 (4)					- - - -	
- 12	Medium dense, brown, wet, F SAND, trace gravel (SP)	NE TO MEDIUM	11.5	X		5	4/6/10 (16)				**C.I. = 11½ feet at completion	-	
	Boring Terminated at 15 ft		15.0			6	4/4/6 (10)					- - - -	
	TES: 1. Weather: Cloudy, 72-77°F 2. Used safety hammer 3. Backfilled with auger cuttings					= Au = Ge = Gr	iger (oprobe ab Sample) = = =	<u>LEG</u> : No : : Cort : She!	END Recover Sampl by Tube	ry $$ = Split-Spoon e $$ = Vane Shear $\frac{1}{2}$	Sample Test	

	Weaver Consultants Group 7121 Grape Road, Granger, IN 46530 574-271-3447(Phone)/574-271-3343(Fax)		LOG OF SOIL BORING NO.: B-3 Location: See Figure 2 in Figures Appendix File No.: 3990-354-19-00 Sheet 1 of 1										
 	WATER LEVEL DATA NE = Not Encountered Started: 7/22/2020 11.5 ft While Drilling ✓ NE ft At Completion** Driller: ft AtHrs. A.D.* Drilling Equip.: ft AtDays A.D.*** Drilling Method:					PROJECT: <u>Multi-Family Residential Facility</u> Hope Avenue South Bend, Indiana 46615 t CLIENT: <u>Alliance Architects</u> 929 Lincolnway East, Suite 200 South Bend, Indiana 46601							
Depth (ft)	DATUM: SURFACE ELEVATION (ft): Image: Solid Description, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL	Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#)= "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)		
- - - - 2 -	Moist, dark brown, SILTY SAND (Topsoil: SM) Moist, dark brown, SILTY SAND (Topsoil: SM) Lose, moist, Light brown, FINE SAND with SILT, trace gravel (SP-SM) Loose, moist, reddish brown, FINE SAND trace	_ 1.2 _ 3.0	X		1	4/4/5 (9)							
- 4 -	gravel (SP)	5.5			2	4/4/4 (8)							
	Loose, moist, dark brown, FINE TO COARSE SAND, some gravel (SP)	_ 0.0			3	3/3/3 (6)							
 10	Loose, moist, light brown, FINE TO MEDIUM SAND, little gravel (SP)	_ 9.5			4	2/2/3 (5)				**C.I. = 11 feet at completion			
	Medium dense, brown, wet, FINE TO COARSE SAND, little gravel (SP)	_ 11.5	X		5	3/3/6 (9)							
	Boring Terminated at 15 ft	_ 15.0			6	4/5/6 (11)							
										- - - - - - - -			
1 200 2330-	T <u>ES:</u> 1. Weather: Cloudy, 72-77°F 2. Used safety hammer 3. Backfilled with auger cuttings	1			= Au = Ge = Gr	iger (oprobe ab Sample	=	<u>LEG</u> = No] = Cort	<u>iEND</u> Recove e Samp Iby Tub	ry $$ = Split-Spoon San le $$ = Vane Shear Test e	ıple		

	Weaver Consultants Group 7121 Grape Road, Granger, IN 46530 574-271-3447(Phone)/574-271-3343(Fax)		LOG OF SOIL BORING NO.: <u>B-4</u> Location: See Figure 2 in Figures Appendix File No.: <u>3990-354-19-00</u> Sheet 1 of 1										
<u> 12.0</u> <u> 12.0</u> <u> </u>	WATER LEVEL DATA NE = Not Encountered Started: 7/22/2020 12.0 ft While Drilling ✓ 12.0 ft At Completion** ♀ Driller: ft AtHrs. A.D.* Drilling Equip.: ft AtDays A.D.*** Drilling Method:					PROJECT: <u>Multi-Family Residential Facility</u> Hope Avenue South Bend, Indiana 46615 t CLIENT: <u>Alliance Architects</u> 929 Lincolnway East, Suite 200 South Bend, Indiana 46601							
Depth (ft)	DATUM: SURFACE ELEVATION (ft): Image: Solid Description, CLASSIFICATION and USCS or AASHTO GROUP SYMBOL	Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#)= "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES			
- - - - 2 -	Moist, dark brown, SILTY SAND (Topsoil: SM) Moist, dark brown, SILTY SAND (Topsoil: SM) Moist, dark brown, SILTY SAND (Topsoil: SM) Medium dense, moist, dark brown, FINE SAND with SILT (SP-SM)	2.0			1	3/5/13 (18)							
- -4 -		5.5	X		2	4/5/5 (10)							
	Loose, moist, brown, FINE TO COARSE SAND, trace gravel (SP)	0.0	X		3	2/3/4 (7)							
- - - - - 10			X		4	3/3/4 (7)							
	P Medium dense, wet, brown, FINE TO COARSE SAND, trace to little gravel (SP)	12.0			5	3/3/4 (7)				+*C.I. = 12 feet at completion			
	Boring Terminated at 15 ft	15.0			6	3/6/8 (14)							
	TES:							LEC	END				
	1. Weather: Cloudy, 72-77°F 2. Used safety hammer 3. Backfilled with auger cuttings				= Aı = Ge = Gr	nger (coprobe ab Sample	=	= No = Cor = She	Recover e Sampl lby Tub	ry $$ = Split-Spoon Sample le $$ = Vane Shear Test e			

Weaver Consultants Group 7121 Grape Road, Granger, IN 46530 574-271-3447(Phone)/574-271-3343(Fax)						LOG OF SOIL BORING NO.: <u>B-5</u> Location: See Figure 2 in Figures Appendix File No.: <u>3990-354-19-00</u> Sheet 1 of 1								
WATER LEVEL DATA NE = Not Encountered Started: 7/22/2020 Completed: 7/22/2020 10.5 ft While Drilling ▼ 10.5 ft At Completion** ♀ ft At_Hrs. A.D.* ft At_Days A.D.***						PROJECT: Multi-Family Residential Facility Hope Avenue South Bend, Indiana 46615 CLIENT: Alliance Architects 929 Lincolnway East, Suite 200 South Bend, Indiana 46601								
Depth (ft)	Symbol	UM: SUR	FACE ELEVATION (ft):	Strata Depth (ft)	Type	Recovery	Number	Standard Penetration Test-Blows/6" (#)= "N" Value	LOI (%)	Qp (tsf)	Moisture Content %	BORING AND SAMPLING NOTES	Elevations (ft)	
2		Moist, dark brown, S Loose, moist, reddis SILT (SP-SM)	ILTY SAND (Topsoil: SM)	1.2			1	7/10/14 (24)					-	
- 4 -							2	4/4/7 (11)					-	
- - 6 -		Loose, moist, reddis SAND, trace gravel	h brown, FINE TO MEDIUM (SP)	5.5			3	3/3/5 (8)					- - -	
		Loose, moist, brown trace gravel (SP)	, FINE TO MEDIUM SAND,	8.0			4	3/4/6 (10)					-	
		⊻∑ Medium dense, brov SAND, trace gravel	vn, wet, FINE TO COARSE (SP)	10.5			5	2/1/5 (6)				**C.I. = 11 feet at completion	- - - -	
		Boring Terminated a	tt 15 ft	15.0			6	3/5/6 (11)					- - -	
													_ - -	
	FEQ.										FND			
C- ELEVATIONS 32 6 C BLEVATIONS 22 6 C BLEVATIONS 22	<u>LES:</u> . Weath . Used . Backfi	ner: Cloudy, 72-77°F safety hammer Illed with auger cuttings					= Au = Ge = Gr	uger (coprobe rab Sample	=	<u>LEC</u> = No = Cor = She	Recover e Sampl lby Tub	ry $$ = Split-Spoon S le $$ = Vane Shear T e	Sample Test	



Tested By: JJW

GRAIN SIZE DISTRIBUTION TEST DATA

Sample Number: 3

Client: Alliance Architects Project: Multi-Family Residential Facility Project Number: 3990-354-19-00 Location: Boring 1 Depth: 6-7.5' Material Description: Poorly Graded SAND with Silt Date: 7-28-2020 USCS Classification: SP-SM Tested by: JJW

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 402.20 Tare Wt. = 171.80 Minus #200 from wash = 4.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
413.20	171.80	1"	0.00	0.00	100.0
		3/4"	0.00	0.00	100.0
		1/2"	0.00	0.00	100.0
		3/8"	1.50	0.00	99.4
		#4	16.80	0.00	92.4
		#8	17.90	0.00	85.0
		#16	25.10	0.00	74.6
		#30	80.00	0.00	41.5
		#50	76.40	0.00	9.8
		#100	6.90	0.00	7.0
		#200	3.20	0.00	5.6

Fractional Components

Cabbles	Gravel			Sand				Fines		
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	7.6	7.6	8.7	60.9	17.2	86.8			5.6

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
	0.3023	0.3548	0.4001	0.4888	0.5848	0.6971	0.8386	1.4739	2.3588	3.8778	5.8683

Fineness Modulus	Cu	Cc
2.90	2.77	0.94

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7/28/2020



Tested By: JJW

GRAIN SIZE DISTRIBUTION TEST DATA

Sample Number: 4

Client: Alliance Architects Project: Multi-Family Residential Facility Project Number: 3990-354-19-00 Location: Boring 4 Depth: 8.5-10' Material Description: Poorly Graded SAND Date: 7-24-2020 USCS Classification: SP Tested by: JJW

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 437.50Tare Wt. = 164.20Minus #200 from wash = 2.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer	
443.70	164.20	1"	0.00	0.00	100.0	
		3/4"	0.00	0.00	100.0	
		1/2"	5.50	0.00	98.0	
		3/8"	3.60	0.00	96.7	
		#4	2.20	0.00	96.0	
		#8	4.10	0.00	94.5	
		#16	8.70	0.00	91.4	
		#30	77.00	0.00	63.8	
		#50	149.50	0.00	10.3	
		#100	18.60	0.00	3.7	
		#200	2.10	0.00	2.9	

Fractional Components

Cabbles	Gravel			Sand				Fines		
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.0	4.0	1.5	59.3	32.3	93.1			2.9

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
0.1832	0.2927	0.3263	0.3516	0.3998	0.4494	0.5045	0.5701	0.7949	0.9051	1.0931	3.1661

Fineness Modulus	Cu	Cc
2.44	1.95	0.96

Weaver Consultants Group

7/24/2020

FIELD EXPLORATION APPENDIX

WEAVER CONSULTANTS GROUP, LLC

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- 6420 Southwest Boulevard, Suite 206, Fort Worth, TX 76109
 7121 Grape Road, Granger, IN 46530

• (312) 922-0201

• (817) 735-9770

• (574) 271-3447

LOG OF SOIL BORING - GENERAL NOTES

		In ord	er to provide unifo	rmity throu	ghout our p	projects,		
		the following Rock shale and	g system has been o other materials w	idopted to c	lescribe each bed in deta	il as encountered		
	CONSIST	ENCY OF COHESIVE SO		n de descri	RELA	TIVE DENSITY OF GRA	NULAR SOILS	
UNCO	NEINED COMPL	PESSIVE			SPT "N	VALUE*	DELATIVE DENSITY	
UNCC	STRENGTH, Q _U (tsf) CO	NSISTENCY	Safety H	lammer	Automatic Hammer	KELATIVE DENSITY	
	<0.25		Very Soft	<	4 0	<3	Very Loose	
	<0.25 0.25 - 0.49		Soft	10	- 9	3 - 7 8 - 21	Medium Dense	
	0.50 - 0.99	Μ	ledium Stiff	30	- 50	22 - 35	Dense	
	1.00 - 1.99	141	Stiff	51	- 80	36 - 60	Very Dense	
	2.00 - 3.99		Verv Stiff	>	80	>60	Extremely Dense	
	4.00 - 8.00		Hard		61.1			
	>8.00	·	Very Hard	*Number of 140-lb. we	of blows per f ight falling fr	eely for 30 in., except whe	the otherwise noted.	
COLOR	R - AS DETERM	INED ON THE FRESH, M	OIST SAMPLES			ABBREVIATION	IS	
	PREDO	MINATE COLORS				DRILLING AND SAME	PLING	
Ι	Black	Yellow		A.D	After Drillin	g PMT	- Pressuremeter Test	
В	Brown	Red		BA -	Bucket Auge	r (3¼-in. Q _C	- Static Cone Penetrometer	
	Gray	Blue			O.D.), excep	t where noted	Reading (tsf)	
SE	IADES	MODIFYING ADJECT	IVES	CFA -	Continuous I	Flight Auger RC	- Rock Core with diamond bit NX	
]	Light	Vari-colored		C.I	Cave-In Dep	th	size, except where noted	
]	Dark	Streaked		CS -	Continuous S	Sampling RQD	 Rock Quality Designation 	
		Mottled		DP -	Direct Push	SPT	 Standard Penetration Test 	
G	RADATION DE	SCRIPTION AND TERMI	NOLOGY	GP -	Geoprobe	SS	- 1 3/8-in. I.D. Split-Spoon Sample	
COM	PONENTS	SIZE RANGE		HA -	Hand Auger		(2-in.O.D.)	
Bo	oulders	Over 8 inches		HSA -	Hollow Sterr	Auger ST	- 3-in. O.D. Thin-Walled Shelby	
С	obbles	8 inches to 3 inches		HPR -	Hollow Prob	e Rod	Tube Sample, except where noted	
C	Bravel	3 inches to # 4 sieve (4.75 m	m)	MR -	Mud Rotary			
	Sand	#4 sieve to #200 sieve (0.075	5 mm)	NR -	No Recovery	WOH	- Weight of Hammer	
	Silt	Passing #200 sieve to 0.005	mm			LABORATORY TES	STS	
	Clay	Smaller than 0.005 min		DD -	Dry Density	(pcf) MD	- Moist Density (pcf)	
				LL -	Liquid Limit	% pH	- Soil Alkalinity/Acidity	
DI	ESCRIPTION O	F COMPONENT	PERCENT OF DRY	LOI -	Loss-on-Igni	tion, PID	- Photoionization Detector (ppm)	
	ALSO PRESEN	Γ IN SAMPLE	WEIGHT		Organic Con	tent (%) PI	- Plasticity Index (%)	
	Tra	ce	1 - 9	MC -	Moisture Co	ntent (%) PL	- Plastic Limit (%)	
	Litt	le	10 - 19	P200 -	Percentage o	f Soil Particles, QP	- Calibrated Hand Penetrometer	
	Son	ne	20 - 34		by dry weigh	t, Passing a	Reading (tsf)	
	An	d	35 - 50		No. 200 U.S.	Standard Q _U	- Unconfined Compressive	
					Sieve		Strength (tsf)	
Water	GRC	OUNDWATER LEVELS	illad or as noted			WATER LEVEL MEASUR	EMENTS	
Porc	sity of soil strata	variations of rainfall site to	nography etc	BF -	Backfilled	D@CI	- Dry at Cave-In Depth	
1010	may ca	ause changes in these levels.	ography, etc.,	DI -	Dry	Dec.i. NE	- Not Encountered	
	•	ORG	ANIC CLASSIFICA	ΓΙΟΝ BY LC	SS-ON-IGN	ITION ¹		
Catal	NT	Organic Content			NT	Organic Content	Course Southala	
Category	Name	(% by dry weight)	Group Symbols	Category	Name	(% by dry weight)	Group Symbols	
	FIBROUS				Clayey			
	PEAT (woody,				ORGANIC		ОН	
ODCANIC	mats, etc.)	75 to 100 % Oreanias		ODCANIC	SILT	5 to 200/ Oreanian		
MATTER	FINE	oither visible on informal	РТ			oither visible or informal		
MATTER	GRAINED	either visible or inferred		SUILS	Organic	entiter visible of inferred		
	PEAT (amor-				SAND or		OL	
	phous)				SILT			
III CI II CI	(1) D				SOIL	T (1 70/ C)		
HIGHLY	Silty Peat	30 to 75% Organics	DT	SLIGHTLY	FRACTION	Less than 5% Organics		
COLC	Cond- D	either visible or inferred	PT	OKGANIC	add slightly	combined visible and	Depend upon inorganic fraction	
SUILS	Sandy Peat			SUILS	Organic	interred		
¹ U.S. Navy	7. (May 1982), Na	val Facilities Engineering Co	mmand. Design Manu	al DM 7.1."Se	oil Mechanics	" Dept. of Navy, Alexand	ria. VA.	

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UNIFIED SOIL CLASSIFICATION SYSTEM Classification Group on basis of Major Divisions **Typical Names** Laboratory Classification Criteria Symbol percentage of fines by dry wt. Well-graded $(D_{30})^2$ gravels and $C_u = D_{60}/D_{10}$ Greater Than 4; $C_c = -$ ----- between 1 and 3 GW gravel-sand mixtures, D₁₀ x D₆₀ GRAVELS little or no fines < 5% passing Clean Gravels Poorly-graded #200 sieve= 50% or gravels and GW, GP, Not meeting both criteria for GW COARSE-GP SW, SP gravel-sand mixtures, more of coarse little or no fines GRAINED Atterberg limits plot below fraction Silty gravels, GM retained gravel-sand-silt > 12% passing "A" line or plasticity index Atterberg limits plotting SOILS on #4 Gravels mixtures #200 sieve= less than 4 in hatched area are sieve w/fines Clayey gravels and GM, GC, Atterberg limits plot above borderline classification GC gravel-sand-clay SM, SC "A" line and plasticity requiring use of index greater than 7 dual symbols mixtures More than Well-graded sands $(D_{30})^2$ SW 50% retained and gravelly sands, 5% to 12% $C_{\mu} = D_{60}/D_{10}$ Greater Than 6; $C_{c} = ----$ between 1 and 3 on No. 200 SANDS Clear little or no fines passing D₁₀ x D₆₀ #200 sieve= sieve Sands Poorly-graded sands SP More than and gravelly sands, Borderline Not meeting both criteria for SW 50% little or no fines Classifications of coarse Silty sands and requiring use of Atterberg limits plot below SM fraction sand-silt dual symbols "A" line and platicity index Atterberg limits plotting passes mixtures less than 4 in hatched area are Sands #4 sieve w/fines Clayey sands and Atterberg limits plot above borderline classifications SC sand-clay "A" line and plasticity requiring use of mixtures index greater than 7 dual symbols Inorganic silts, Equation of "A" line: PI = 0.73 (LL-20) 60 very fine sands, CH and OH ML rock flour, silty For classification of fine-grained soils and SILTS or clayey fine sands 50 fine fraction of coarse-grained "A" LINE soils, Atterberg limits plotting in & Inorganic clays of the hatched area are boderline classifications requiring the CLAYS low to medium PLASTICITY INDEX 40 use of dual symbols. CL plasticity, gravelly FINE-Liquid clays, sandy clays silty clays, lean clays 30 I imit GRAINED 50% Organic silts and CL and OL OL or less organic silty clays MH and OH 20 SOILS of low plasticity Inorganic silts, 10 SILTS micaceous or & MH diatomaceous fine CL-MI CLAYS 50% or more sands or silts, 0 passes elastic silts 30 40 100 110 0 10 20 50 60 70 80 90 No. 200 Liquid Inorganic clays of LIQUID LIMIT CH sieve Limit high plasticity greater Fat clays than Organic clays of 50% OH medium to high **Plasticity Chart** plasticity HIGHLY Peat, Muck PT ORGANIC and other highly SOILS organic soils
FIELD EXPLORATION PROCEDURES

Standard Penetration Test Soil Borings

General

We wish to point out that the soils actually recovered from our borings for observation and testing represent a very small percentage of the site soils. Our records depict subsurface conditions only at specific locations and at the particular time when drilling. Soil conditions at other locations may differ from conditions occurring at these boring locations. The passage of time may result in a change in the subsurface soil and groundwater conditions at the boring locations. The interface between differing subsurface materials on the logs and profiles represent approximate boundaries. The transition between materials may be gradual. Also, thin strata that occur between sample depths may be present, but remain undetected by routine sampling procedures.

Drilling Procedures

Soil borings were performed at the approximate locations shown on the attached boring plan. The soil borings were advanced by mechanically twisting a continuous steel-flight, hollow-stem auger into the soil. The inside diameter (I.D.) of the hollow-stem auger is typically 3-¼ in. (sometimes a 6-in. I.D. auger is used, particularly when installing 4-in. diameter monitoring wells).

The auger is turned into the ground, which displaces the soil upwards as it advances. Once the desired sample depth is achieved, the advancement of the hollow-stem auger is stopped. The hollow-stem is then cleaned of any soil and the sampling tools are inserted, and the sampling is performed. When drilling below the water table in pervious soils, a head of water is maintained in the hollow-stem, to prevent a "quick" condition at the auger tip.

Penetration Testing and Split-Barrel Sampling

Standard Penetration Testing and split-barrel sampling are normally conducted in the borings to provide relative density information and soil samples for visual classification and laboratory testing. The standard split-barrel (commonly called split-spoon) sampler is a 2-in. O.D., 1.375-in. I.D., typically 18 to 24 in. long and is connected to an AW or N size drilling rod. The sampler is then driven into the soil with a force of a 140 lb. hammer free-falling a distance of 30 in. The number of hammer blows required to drive the sampler into the soil is recorded for each 6-in. interval. The sampler is typically driven a total of 18 in., and the last two 6-in.

interval blow counts are added together and commonly referred to as the "N" value, blow count or penetration resistance. Representative samples are placed in airtight glass jars and returned to our laboratory for further observation and testing. Descriptions of the spilt-barrel samples and the penetration resistances are shown on the boring logs.

Shelby Tube Sampling Procedure

In the Shelby tube sampling procedure, a thin-walled steel seamless tube with a sharp cutting edge is pushed hydraulically into the soil and a relatively undisturbed sample is obtained. This procedure is generally employed in <u>cohesive</u> soils. The tubes are carefully handled in the field to avoid excessive disturbance and are returned to the laboratory for extrusion and further analysis and testing.

Calibrated Pocket Penetrometer Testing

The strength of cohesive soils does not correlate as well as granular materials with the Standard Penetration Testing described above. Typically, we test split-barrel samples of cohesive soils with a calibrated pocket penetrometer in the field. This test involves pushing a spring-loaded piston, 0.25-in. in diameter, into the sample and measuring the spring deflection, which has been correlated to shear strength. This test is used as a rough approximation method only. More refined results require undisturbed Shelby tube sampling and laboratory unconfined compressive strength testing.

Water Level Readings

When the drilling crew notices groundwater or significant variations in soil moisture, they are recorded on the boring logs. Generally, the level of water at the time of drilling is measured and recorded. The readings may indicate the approximate level of the hydrostatic water table at the time of our drilling activities.

Where low permeability soils are encountered, the water seeps into the borings at a slow rate, and it is generally not possible to establish accurate groundwater level readings in an open borehole during the drilling operations. If water-drilling methods are used, a local groundwater "mound" could be created, taking several days to dissipate. Also, the groundwater level typically fluctuates on a long-term or seasonal basis, due to variations in precipitation, surface run-off, evaporation, etc. When these long-term readings are required, piezometers or monitoring wells are necessary to maintain an open hole.

Boring Log Preparation

The subsurface conditions encountered during drilling are reported on a field log recorded by the chief driller. The driller's field record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these records contain both factual and interpretive information. The field logs are on file in our office.

The soil samples, plus the field logs, are reviewed by a geotechnical engineer, geologist, or geotechnician. The engineer/geologist/geotechnician then classifies the soil in general accordance with the Unified Soil Classification System and prepares the final boring logs, which are the basis for our evaluations and recommendations. The group symbol for each soil type is indicated in parentheses following the soil descriptions on the boring logs. The final boring logs represent our interpretation of the contents of the field logs based on the results of the engineering review and laboratory testing of the field samples. The final boring logs are included in this section.

LABORATORY TESTING PROCEDURES

Representative soil samples were selected and tested in our laboratory in order to check field classifications and to evaluate pertinent engineering properties. The laboratory testing program included visual classification of all samples and hand penetrometer tests on all cohesive samples. In the hand penetrometer test, the unconfined compressive strength of a cohesive soil is estimated by measuring the resistance of the soil sample to penetration by a small spring calibrated cylinder. Any additional tests are described below or on the following sheet(s). Appropriate data obtained from laboratory tests are also included on the respective boring logs.

A geotechnical engineer classified each soil sample on the basis of texture and plasticity in accordance with the Unified Soil Classification System (ASTM D 2487 and/or ASTM D 2488). The group symbol for each soil type is indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the Unified System is included with this report.

Data obtained from the field logs and appropriate laboratory tests have been shown on the boring logs. The procedures used in preparing the final boring logs are described on the sheet entitled "Field Exploration Procedures."

It should be noted that the geotechnical engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earthen materials shown on the boring logs and profiles are approximate; in-situ, the transitions may be gradual.

All samples will be retained in our Granger, Indiana laboratory for a period of thirty (30) days after which they will be discarded unless other instructions as to their disposal are received.

Grain Size Tests

Grain-size tests are performed to determine the soil classification and the grain-size distribution. The soil samples are prepared for testing according to ASTM D 421 (dry preparation) or ASTM D 2217 (wet preparation). The grain-size distribution of soils coarser than a No. 200 U.S. Standard sieve (0.074 mm opening) is determined by passing the samples through a standard set of nested sieves. Materials passing the No. 200 U.S. Standard sieve are either suspended in water and the grain-size distribution calculated in accordance with ASTM D 422, or are washed over the No. 200 sieve in accordance with ASTM D 1140.

QUALIFICATION APPENDIX

GENERAL QUALIFICATIONS

This report has been prepared at the request of our client for his use on this project. The work, including the field work, laboratory testing, and engineering analysis, was performed in accordance with generally accepted Geotechnical Engineering practices. For this study, we were not retained to address environmental or land use restriction concerns. This warranty is in lieu of all other warranties either expressed or implied.

This report may not contain sufficient information for purposes of other parties or other uses. Should there be any sufficient differences in structural arrangement, loading or location of the structure, our analysis should be reviewed.

The analysis, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our exploration and further assume that the borings are representative of the subsurface conditions throughout the site.

If during construction, different subsurface conditions from those encountered during our exploration are observed or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

We urge that we be retained to review those portions of the plans and specifications that pertain to earthwork and foundations to determine whether they are consistent with our recommendations. In addition, we are available to observe construction, particularly the compaction of structural backfill and preparation of the foundations, and such other field observations as may be necessary.

In order to fairly consider changed or unexpected conditions that might arise during construction, we recommend the following verbiage to be included in the project contract.

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

The owner has had a subsurface exploration performed by a Geotechnical consultant, the results of which are contained in the consultant's report. The consultant's report presents his conclusions on the subsurface conditions based on his interpretation of the data obtained in the exploration. The contractor acknowledges that he has reviewed the consultant's report and any addenda thereto, and that his bid for earthwork operations is based on the subsurface conditions as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

Should the contractor encounter conditions that are different than those anticipated by the Geotechnical consultant's report at any time during construction operations, he shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the consultant's report, he shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions in which unit prices are not provided, the additional work shall be paid for on a time and material basis.

03 10 00 - CONCRETE FORMWORK

A. GENERAL

1. SUMMARY

a. This section covers furnishing all labor, materials, tools and equipment required to erect metal and/or wood formwork as required for the execution of the concrete work as shown on the drawings, as herein specified and/or as required for a complete job.

2. JOB REQUIREMENTS

- a. Where metal and/or wood formwork is used, joints in forms shall be made tight to prevent leakage of concrete and shall be filled where necessary to make tight and smooth.
 - 1) Earthen formwork will be acceptable provided all criteria meet or exceed configurations and dimensions specified.
 - 2) All metal and/or wood forms shall be oiled with heavy base paraffin oil.
- b. Perfect finish will not be required of those surfaces which are to be concealed by subsequent construction.
 - 1) All such surfaces shall, however, be true to plan and profiles detailed.
- c. Reinforcing bars shall be covered by concrete a minimum of 3" when concrete is cast against and permanently exposed to earth.
 - When concrete is formed but is exposed to weather or earth, No. 5 bars or less shall have a concrete covering of 1¹/₂" minimum; No. 6 bars or greater shall have a covering of 2" minimum.

3. CONSTRUCTION AND REMOVAL OF FORMS

- a. Forms shall conform exactly to the shape, lines and dimensions of the member.
 - 1) They shall be tight enough to prevent leakage of mortar and substantial enough to bear the pressure of concrete without bulging or settling.
 - 2) They shall be neat and true of surface with all showing lines level or plumb unless otherwise specified.
 - 3) Condition and treatment of forms shall be such that when removed, the concrete surface will be of neat appearance.
 - 4) Metal ties shall not be left within 1" of any concrete surface.
- b. Forms for vertical surfaces may be removed in twenty-four (24) hours at normal temperatures providing the concrete is sufficiently hard not to be injured thereby.
 - 1) In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to safely support their weight and the load thereon.

03 20 00 - CONCRETE REINFORCEMENT

A. GENERAL

1. SUMMARY

a. This section covers the furnishing all labor, materials, tools and equipment required to place of all reinforcing steel, reinforcing mesh, spirals, chairs, spacers, raising bars, stirrups, temperature steel, etc., as required for all reinforced concrete work as shown on drawings, as herein specified and/or as required for a complete job.

2. JOB REQUIREMENTS

- a. Reinforced concrete work shall comply with the provisions of the manual of "Building Code Requirements for Reinforced Concrete", ACI 318, of the American Concrete Institute with Latest Revisions.
- b. Where welded wire fabric reinforcing is shown on the drawings in building floor slabs, it is required for the bearing condition and associated crack control and must be installed regardless of the use of fiber reinforcing.
- c. Concrete slabs and sidewalks are to receive fiber reinforcing as specified herein. The reinforcing fiber manufacturer or approved distributor shall provide the services of a qualified employee for a pre-job meeting and for consultation with ready-mix plant representatives.

B. PRODUCTS

- 1. MATERIAL
 - a. <u>Reinforcing Steel</u>:
 - All reinforcing steel shall be deformed type intermediate grade billet steel conforming to ASTM specifications designation A615 with A305 deformations. Fabrication of reinforcing steel shall be in accordance with the Manual of Standard Practice CRSI-MSP-2, latest edition.
 - 2) The reinforcement steel shall be unpainted or uncoated and shall be free from excessive rust, loose scale or other coating of any character which would reduce or destroy the bond.
 - a) Chairs for concrete work exposed to the weather shall be galvanized.
 - b. <u>Welded Wire Fabric</u>:
 - Welded wire fabric for concrete reinforcement shall be electrically welded annealed steel wire mesh of sizes shown and shall conform to ASTM Specifications designation A185 except that weld shear strength requirement of Section 5b of those specifications shall be extended to include a wire size differential up to and including 6 gauges.
 - c. <u>Reinforcing Fibers</u>: Concrete Engineered Reinforcing
 - 1) Fibers shall be polypropylene, collated fibrillated micro-fibers ,Fibermesh 300e3 as manufactured by Sika Corporation, Chattanooga, Tennessee or Architect approved equal.
 - 2) Fibers shall be designed and manufactured specifically for use in

concrete from virgin polypropylene and shall be so certified by the manufacturer.

C. EXECUTION

- 1. INSTALLATION
 - a. <u>Placing Reinforcing Steel</u>:
 - 1) All reinforcing steel shall be placed strictly in accordance with the drawings and shall be supported at the proper height above the forms and at the proper position by means of approved metal chairs, spacers or metal hangers.
 - a) Enough spacers are to be provided to insure against displacement when concrete is being deposited.
 - Clearance from outside of concrete for all reinforcing bars shall comply with the provisions of the manual of Standard Practice for Detailing Reinforced Concrete Structures ACI 315, latest edition, and as noted on the drawings.
 - b. <u>Placing Welded Wire Fabric</u>:
 - 1) Position all welded wire fabric 2" from the top of slabs and lap 6" or one full mesh at all edges.
 - c. <u>Reinforcing Fibers</u>:
 - 1) Fibers are to be supplied to the concrete supplier and are to be added to the concrete mix at the rate of 1½ lbs. per cubic yard.
 - a) Thoroughly mix fibers to achieve uniform distribution throughout the concrete in all directions.

03 30 00 - CAST-IN-PLACE CONCRETE

A. GENERAL

1. SUMMARY

- a. This section covers the furnishing and mixing of heavyweight aggregate cast-inplace concrete as shown on the drawings and/or as herein specified.
- b. <u>Storage of Materials</u>:
 - 1) All materials used in the work shall be stored and handled in such a manner as will prevent deterioration or the intrusion of any foreign matter.
 - a) All material which has deteriorated or has been damaged shall be immediately and completely removed from the work.
 - 2) Manufactured materials such as cement, admixture, etc., shall be delivered and stored in the original packages, plainly marked with the brand and the maker's name.
 - a) Material in broken containers or in packages showing water marks or other evidence of damage will be wholly rejected.
- c. <u>Compliance with Standards</u>:
 - All materials and operations specified shall comply with the current edition of "Design and Control of Concrete Mixtures", published by the Portland Cement Association and latest ACI standard "Building Code Requirements for Reinforced Concrete" published by the American Concrete Institute.
- d. <u>Weather Requirements</u>:
 - 1) No concrete shall be mixed or placed during freezing weather or after an extended period of freezing weather unless special precautions are taken to free all materials to be used from frost and ice and to prevent freshly placed concrete from freezing before it has cured sufficiently.
 - 2) In concreting during cold weather, all aggregates and mixing water shall be uniformly heated by means of steam coils or other approved methods until no material entering the mixer will have a temperature of less than 50° F. nor more than 120° F.
 - 3) Building wherein concrete is to be deposited shall be enclosed and fresh concrete shall be covered with tarpaulins or approved building paper and adequate means shall be provided for heating the structure so that the temperature at no point will fall below 50° F. for a period of seventy-two (72) hours after placing.
 - 4) The Contractor shall provide all equipment and fuel needed for any heating that may be required, as well as the necessary labor and watchmen to attend fires and insure proper heating at all times, both day and night.
 - a) Covering must be so arranged that there will be free air circulation around all fresh concrete.
 - b) The use of salt or chemicals to retard freezing or manure as a covering for fresh concrete will not be permitted except as specified.
 - 5) Under no circumstances shall concrete be placed on a frozen subgrade.
 - 6) If any concrete is found to have frozen, it shall be immediately and completely torn out and new concrete placed.

- 7) If concrete is to be placed at temperatures below 50° F., the Contractor may add calcium chloride up to, but not to exceed, 2% by weight of cement.
 - a) The amount of calcium chloride added to the cement shall be in accordance with the temperature variation and no concrete shall be poured in temperatures below 25° F.
- 8) All concrete shall have 5% 7% air entraining in the mix.
- 9) Concrete deposited in hot weather must be kept moist by being covered with sand and being continually wet with cool, clean water.
 - a) This drenching shall take place three (3) times a day for seven
 (7) days or longer if considered advisable by the Architect or an approved concrete curing compound may be used.
- e. <u>Relation to Other Work</u>:
 - 1) Build into the concrete all inserts, anchors, ties and hangers as required to secure the work of the other trades.
 - 2) Cooperate with all other trades for above items required to be placed in the forms before pouring concrete.
- f. Additional Work:
 - 1) This Contractor shall furnish and install concrete filled pipe bollards as shown on the drawings.

B. <u>PRODUCTS</u>

- 1. MATERIALS
 - a. <u>General</u>:
 - 1) All concrete materials shall comply with the Standard specifications for Ready-Mixed Concrete, ASTM Designation C-94.
 - b. <u>Portland Cement</u>:
 - 1) ASTM C-150 Type 1 Cement
 - c. <u>Water</u>:
 - 1) All water used in concrete work shall be clean and free from injurious amounts of acids, alkali, organic matter or other substances that may be deleterious to concrete or steel.
 - d. <u>Concrete Aggregates</u>:
 - 1) Concrete aggregates shall conform to the latest "Standard Specifications for Concrete Aggregates", ASTM Serial Designation C-33.
 - 2) The producer of both coarse and fine aggregates shall cause accurate sieve analyses of these materials to be made, at no expense to the Owner, and shall supply copies (in triplicate) of such analyses, together with his certification as to their accuracy.
 - e. <u>Coarse Aggregate</u>:
 - 1) Shall be clean, hard, washed, screened limestone or gravel, free from dust, flat, laminated particles and an excess of fine materials.
 - 2) Limestone aggregate is to be used for all concrete except that which is completely covered below the earth.
 - 3) Coarse aggregate shall be graded as follows:
 - a) For Slabs, Beams and Columns:

- (i) 1" maximum size
- (ii) 100% shall pass a 1" screen
- (iii) Not less than 90% shall pass a 3/4" screen
- (iv) Not less than 20% or more than 55% shall pass a
- (v) 3/8" screen
- (vi) Not more than 10% shall pass a No. 4 sieve
- b) For Walls and Footings:
 - (i) 1 1/2" maximum size
 - (ii) 95% 100% shall pass a 1 1/2" screen
 - (iii) 35% 70% shall pass a 3/4" screen
 - (iv) 10% 30% shall pass a 3/8" screen;
 - (v) 0% 10% shall pass a No. 4 sieve
- f. <u>Fine Aggregate</u>:
 - 1) Shall consist of natural sand having clean, hard, strong, durable, uncoated grains, free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious matter.
 - a) The sand shall be of such sizes that it shall pass a 3/8" sieve and shall be graded from coarse to fine so as to produce the minimum percentage of voids within the following limits:
 - b) Retained on the No. 4 sieve, not more than 5% by weight; retained on No. 100 sieve, not less than 92% by weight; weight removed by decantation, not more than 3%.
- g. <u>Admixture</u>:
 - 1) Master Pozzolith 80 as manufactured by the Master Builders Solutions Company.
- h. <u>Grout</u>:
 - 1) Embeco pre-mixed, non-shrink grout or Architect approved equal.
- i. <u>Pre-Molded Expansion Strips</u>:
 - Provide approved pre-molded expansion strips where shown and/or specified. Expansion material shall be asphalt expansion joint material as manufactured by W.R. Meadows, Inc. or equal by NOMACO. Premolded expansion strip to be set at perimeter of all slabs intersecting masonry or concrete walls or any penetrating item.

C. EXECUTION

- 1 INSTALLATION
 - a. <u>Mixture and Strength</u>:
 - 1) Concrete mixtures shall be made in accordance with the latest ASTM Specifications and as listed below.
 - a) Air-entraining admixtures ASTM Designation C-260 and C-233.
 - b) Air-entraining additions and air-entraining cements ASTM Designation C-226 and C-175.
 - 2) 5% to 7% air-entrained concrete for all concrete work except interior slabs.
 - 3) Concrete for footings (gravel) shall provide a minimum twenty-eight (28) day compressive strength of 3,000 psi and the balance of the work (limestone), including but limited to slabs, walls, and piers, shall provide a minimum twenty-eight (28) day compressive strength of 4,000 psi.

- b. <u>Tests</u>:
 - 1) Concrete cylinder tests will be made in accordance with the latest ASTM Serial Designations C-31 and C-39.
 - a) Trial batch compression tests of seven (7) and twenty-eight (28) days will be made.
 - 2) Not less than three (3) specimens shall be made for each test not less than one (1) test for each 150 cu. yds. of concrete poured, but in no case shall there be less than one (1) test for each day concreting if said concreting is continued for a full day.
 - a) The standard age of test shall be twenty-eight (28) days but seven (7) day tests may be used provided that the relation between seven (7) and twenty-eight (28) day strengths is established by test for the materials and proportions used.
 - 3) Testing described herein will be the responsibility of the Contractor.
 - a) Copies of all tests results to be furnished in triplicate to the Architect.
 - b) Any additional tests that may be found necessary will be paid for by the Owner.
- c. <u>Proportions</u>:
 - 1) Concrete shall be composed of coarse aggregate, fine aggregate, portland cement, specified admixtures and water.
 - a) Employ the normal portland cement and Pozzolith in ratios as recommended by the manufacturer.
 - 2) Suitable means shall be provided for controlling and accurately measuring the water.
 - a) Free water or moisture carried by the aggregate shall be included as a part of the mixing water.
 - 3) The manufacturer shall provide a qualified concrete technician to assist in preparing design mixes and to provide field service.
 - a) Mixes shall be proportioned in accordance with ACI-613 to produce concrete with slump, air content, maximum size of coarse aggregate, materials designed to reduce bleeding and segregation and strength as previously specified.
 - 4) Concrete when mixed as herein specified and tested for consistency in accordance with the methods specified under the latest Serial Designation of the ASTM, shall have slump of 3" to 4"
 - a) If tests show excessive slumps, the proportion of material and the mixing methods shall be modified as necessary to reduce the slump.
- d. <u>Mixing and Placing Concrete</u>:
 - 1) All concrete shall be ready-mixed, supplied by an approved plant.
 - a) On-job mixed concrete will not be used on this job without written approval and specifications from Architect.
 - 2) Concrete shall be placed in the forms in such a manner as will require a minimum of handling.
 - a) Movement of fresh concrete from point of deposit to final position, where necessary, shall be by shoveling rather than by raking or crowding.
 - b) Freshly deposited concrete shall be adequately vibrated so that the forms will be completely filled and otherwise connected to produce a finished surface that will be free from defects and will have a workmanlike finish.

- 3) Such methods shall be employed in conveying and handling concrete that no mortar will be lost and that the concrete as placed is dense and uniform throughout with no lack or excess of mortar at any place.
 - a) All forms shall be well wetted before concrete is placed.
- 4) In the construction of footings, columns and walls, the concrete surface shall be kept horizontal.
- 5) Before placing fresh concrete against that which has already set, the contact surface shall be thoroughly cleaned, wetted down and faced with a coat of neat cement grout immediately before placing new concrete.
- 6) Walking on concrete shall not be permitted for at least twenty-four (24) hours after it has been placed.
- 7) Wall and pier forms shall be slightly overfilled at conclusion of pouring operation.
 - a) Concrete shall be allowed to settle and then laitance shall be screeded off and wall floated level.
 - b) Accurately set necessary anchor bolts and/or setting plates, level and true to line, fully bedded.
- 8) Forms shall be so constructed so that in no case will the concrete be allowed to drop from a height of more than 6'.
 - a) This shall be accomplished by strategic use and placement of pouring ports.
- e. <u>Concrete Drives, Walks, Curbs, Etc.</u>:
 - 1) Deposit concrete in forms upon wetted subgrade to such depth that upon being compacted it shall be full thickness required.
 - 2) Deposit concrete in curb section in layers not more than 7" well-tamped, spaded and vibrated.
 - 3) Concrete shall be leveled off and tamped sufficiently to bring mortar to surface then wood float finish.
 - 4) Provide transverse expansion joints (3/8" thick pre-molded expansions strips) on 40' maximum centers and/or where shown on drawings.
 - 5) Score walk transversely at intervals not exceeding width of walk.
 - 6) Provide expansion joints between concrete walks and curbs (1/2"thick pre-molded expansion strip).
- f. <u>Construction Joints</u>:
 - 1) Joints not indicated on the drawings shall be so made and located so as not to impair the strength of the structure.
 - 2) Where a horizontal joint is to be made, any excess of water and laitance shall be removed from the surface after concrete is deposited.
 - 3) Before depositing of concrete is resume, the hardened surface shall be cleaned and roughened and all weak concrete removed, and the joint grouted with neat cement and water.
 - 4) Construction joints through walls, footings and slabs shall be vertical.
 - 5) Keys shall be provided in construction joints as directed by the Architect.
 - 6) In walls, the joints shall be keyed and provided with #5 x 3'-0" reinforcing bars set 12" o.c.
- g. <u>Curing</u>:
 - 1) Freshly placed concrete shall be protected from premature drying and excessively hot or cold temperatures and shall be maintained in a moist condition at a relatively constant temperature for at least seven (7) days

after placement or longer if required for the hydration of the cement and proper hardening of the concrete.

- 2) Use methods as approved by the Architect.
- h. Soils Check:
 - 1) All footing trenches and slab fill must be checked and approved by an approved Soils Engineer prior to the placing of any concrete.
 - 2) Such checks will be at the Contractor's expense and it will be the sole responsibility of the Contractor to notify the Soils Engineer at such times as inspection is required.
- i. <u>Concrete Replacement</u>:
 - 1) In the event that concrete is placed which does not meet or exceed the strength requirements as herein specified, all such concrete shall be removed and replaced with concrete of the specified strength.
 - a) This removal and replacement shall be at the Contractor's expense.

03 30 53 - CAST-IN-PLACE CONCRETE FINISHES

A. GENERAL

1. SUMMARY

a. This section covers the finishing of all cast-in-place concrete work specified as well as curing, sealing, hardening and dustproofing all concrete floors.

2. FINISH SURFACES AND WORKMANSHIP

- a. <u>General</u>:
 - Unless the drawings indicate otherwise, all finishes concrete floors and subfloors shall not show a greater variation than 1/8" in any direction, as determined by a 10 ft. straight edge. Under kitchen cabinets and under bathtubs, variation shall not exceed 1/16" in any direction.
- b. <u>Steel Trowel Finish</u>:
 - 1) Floor slabs scheduled to remain exposed or to receive vinyl flooring or carpeting shall receive steel trowel finish.
- c. <u>Workmanship</u>:

1)

- Screed and float slabs to final elevations are shown on the drawings.
 - a) Check with straight edge for high and low spots.
 - b) Machine trowel or hand trowel when concrete surface has hardened sufficiently.
 - c) After floor is hard enough to ring under the trowel, it shall receive a final troweling or burnishing as required to eliminate all tool marks.
- d. <u>Curing, Sealing, Hardening and Dustproofing</u>:
 - 1) Use Kure-N-Seal 30 as manufactured by Sonneborn Building Products, Inc., Cur-N-Seal as manufactured by BASF Construction Chemicals, LLC or Architect approved equal on all concrete building slabs.
 - 2) Prepare surface and apply as recommended by manufacturer or as specified herein.
- e. <u>Broom Finish</u>:
 - 1) All exterior concrete slabs, walks, stoops, etc. shall have broom finish.
 - a) Roughen lightly by broom or burlap to produce grooves transverse to the direction of traffic.
 - b) Verify area pattern with Architect.
- B. PROUCTS (NOT USED)
- C, EXECUTION
 - 1. PROTECTION
 - Adequately protect concrete from mechanical or other damage for at least seven
 (7) days after pouring.

03 54 00 - GYPSUM CONCRETE

A. GENERAL

1. SUMMARY

a. This section covers furnishing all labor, materials, tools and equipment required to install all gypsum concrete floor underlayment as shown on drawings, as specified herein and/or as required for a complete job.

b. <u>Storage of Materials</u>:

- 1) All materials used in the work shall be stored and handled in such a manner as will prevent deterioration or the intrusion of any foreign matter.
 - a) All material which has deteriorated or has been damaged shall be immediately and completely removed from the work.
- 2) Manufactured materials shall be delivered and stored in the original packages, plainly marked with the brand and the maker's name.
 - Material in broken containers or in packages showing water marks or other evidence of damage will be wholly rejected.
- c. <u>Weather Requirements</u>:

a)

1) Reference Section <u>03 30 53 CAST-IN-PLACE CONCRETE</u> for weather requirements applicable to this section. Building interior must be ventilated and heated (min. 50° F.) to assure completion of drying process.

B. PRODUCTS

- 1. MATERIALS
 - a. For convenience and to establish the type of product desired, the products of Hacker Industries, Inc. are listed.
 - a) Products meeting this specification and the fire test requirements listed on the drawings, manufactured by Maxxon Corporation, are included in this specification.
 - b. <u>Gypsum Concrete</u>:
 - 1) "Firm-Fill" gypsum concrete floor underlayment as manufactured by Hacker Industries, Inc.
 - 2) Architect Approved Equal.
 - c. <u>Sealer</u>:
 - 1) Hacker Floor Primer, Sealer, and asphalt emulsion.
 - 2) Architect Approved Equal.
 - d. <u>Sand</u>:
 - 1) 1/16" or less washed plaster or mortar sand.
 - e. <u>Water</u>:

1) Potable and free from impurities.

2. INSULATION

- a. <u>Mixing Instruction</u>:
 - 1) 6 to 7 gallons of water and 1.9 cubic feet of sand per 80lb. bag of Hacker Gypsum Concrete.
- b. <u>Sub-Floor Preparation</u>:
 - 1) Sub-floor is to be structurally sound (L/360), broom clean and free of oil, grease or other contaminants.
 - a) All cracks and voids are to be filled with a quick setting taping compound to prevent leakage.
 - b) Any weak or delaminated sections of wood flooring are to be replaced prior to placing of gypsum concrete.
- c. <u>Priming</u>:
 - 1) Spray one (1) coat of Hacker floor primer over entire plywood deck at a rate of one (1) gallon per 500'.
- d. <u>Application</u>:
 - 1) Mix gypsum concrete, sand and water in an approved high-speed mixing device and blend for a minimum of one minute.
 - a) Pump over wood sub-floor at a minimum of 3/4" thickness, spreading and screeding to a smooth surface.
 - Place gypsum concrete continuously so that no slurry is placed against gypsum concrete that has obtained its initial set, except at authorized joints.
- e. <u>Protection</u>:
 - 1) Temporary wood planking shall be placed over gypsum concrete where same is to be subjected to heavy wheeled or concentrated loads.
 - a) Gypsum concrete shall be free of any moisture prior to the installation of finished flooring goods.
- f. All work described herein is to be performed in strict accordance with all manufacturer's specifications.
 - 1) Perform field tests as recommended by manufacturer and submit test results to Architect certifying compliance with same.

04 21 13 ADHERED STONE MASONRY

A. GENERAL

1. SUMMARY

a. <u>Section Includes</u>: Non-load bearing, natural thin veneer applied with cement mortar to a structural back-up wall including mortar, metal lath, weep system, special stone shapes, and installation of plywood sheathing, and weather-resistant underlayment.

2. RELATED DOCUMENTS

- a. Section <u>05 50 00 METAL FABRICATIONS</u>: Rolled steel lintels, shelf angles, and other structural supports; anchors; and other steel components for building into natural thin veneer.
- b. Section <u>06 10 00 ROUGH CARPENTRY</u>: Wood framing and composite insulation wall sheathing for supporting natural thin veneer.
- c. Section 07 62 00 SHEET METAL FLASHING AND TRIM.
- d. Section 07 92 00 JOINT SEALANTS: Sealant for perimeter and control joints.
- e. Section 09 21 16 GYPSUM DRYWALL ASSEMBLIES.

3. REFERENCES

- a. ASTM C79M Treated Core and Non-Treated Core Gypsum Sheathing Board.
- b. ASTM C91 Standard Specification for Masonry Cement.
- c. ASTM C97 Standard Specification for Absorption and Bulk Specific Gravity of Dimension Stone.
- d. ASTM C144 Aggregate for Masonry Mortar.
- e. ASTM C150 Standard Specification for Portland Cement.
- f. ASTM C170 Standard Specification for Compressive Strength of Dimension Stone.
- g. ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes.
- h. ASTM C270 Mortar for Unit Masonry.
- i. ASTM C476 Grout for Masonry.
- j. ASTM C568 Standard Specification for Limestone Dimension Stone.
- k. ASTM C615 Standard Specification for Granite Dimension Stone.
- I. ASTM C616 Standard Specification for Quartz Based Dimension Stone.
- m. ASTM C629 Standard Specification for Slate Dimension Stone.
- n. ASTM C780 Preconstruction Evaluation of Mortar for Plain & Reinforced Masonry.

- o. ASTM C847 Standard Specification for Metal Lath.
- p. ASTM C880 Standard Specification for Flexural Strength of Dimension Stone.
- q. ASTM C1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
- r. ASTM D226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- s. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- t. ASTM D4632 Standard Test Method Grab Breaking Load and Elongation of Geotextiles.
- u. ASTM D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
- v. ASTM E96 Standard Test Method for Water Vapor Transmission of Materials.
- w. ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures.
- x. ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.
- y. ANSI A118.4 Specifications for Latex-Portland Cement Mortar.
- z. PCA Portland Cement Plaster (Stucco) Manual.
- 4. SUBMITTALS
 - a. Submit the following under the provisions of this Specification.
 - 1) Product data for natural dimensional stone, mortar design, weep system, and accessories.
 - 2) Shop drawings for layout of stone veneer work illustrating coursing and pattern and details for instructions of built-in items, flashing, weep system, window and door openings, penetrations, control joints, and joints with adjacent materials.
 - 3) Copies of test reports or certificates showing compliance with specified requirements.
 - b. <u>Design Data</u>: Submit design mix when property specification of ASTM C270 is to be used, with required environmental conditions, and admixture limitations.
 - c. <u>Selection Samples</u>:
 - 1) Selected dimensional stone illustrating color range, surface, and texture.
 - a) Two stones minimum $6^{"} \log x 3^{"}$ wide.
 - b) Mortar sample, 1/2" by 4" minimum, illustrating selected color.
 - c) 4" x 4" minimum size of weep system material.

5. QUALITY ASSURANCE

a. <u>Manufacturer's Qualifications</u>: Company owning and operating stone quarry and specializing in quarrying, cutting, and dressing natural stone for masonry assemblies with 5 years minimum documented, successful experience.

- b. <u>Installer Qualifications</u>: Company specializing in performing stone masonry work with 5 years documented, successful experience.
- 6. MOCK-UP
 - a. Construct sample panel at location indicated or directed, illustrating color, finish, texture, joints, construction methods, and workmanship quality. Mock-up shall be done as follows:
 - 1) Mock-up shall be building corner illustrating Natural Thin Veneer and mortar combination, coursing, and pattern. Mock-up shall be constructed with:
 - a) Natural Thin Veneer as specified in this section.
 - b) Mortar, weep system, metal lath, specified in this section.
 - c) Sheathing and other specified accessories.
 - 2) Size shall be minimum 4' high by 4' long.
 - 3) Obtain architect's acceptance of sample panel before beginning construction activities of this section.
 - 4) Do not remove sample panel until construction activities of this section have been accepted by the architect. Completely remove when work is accepted.

7. DELIVERY, STORAGE AND HANDLING

- a. Store products on pallets, under cover and in manufacturer's unopened packaging until ready for installation to avoid chipping, breakage, marring faces, and contact with contaminating materials.
- b. Store stone materials on pallets on a dry level surface. Pallets shall not be stacked and shall be covered with tarps.
- c. Store mortar and cementitious materials under cover and in an area where temperature is maintained between 40°F to 110°F.

8. ENVIRONMENTAL REQUIREMENTS

- a. Maintain materials and surrounding air temperature to following limits prior to, during, and 24 hours after completion of masonry veneer and application of water-repellent coating:
 - 1) Minimum 40°F.
 - 2) Maximum 90°F.
- b. <u>Hot and Cold Weather Requirements</u>: In accordance with ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.
- c. When ambient temperature falls below 50°F, heat mortar mixing water.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Acceptable Manufacturer</u>: Eden Stone Co. Inc., W4520 Lime Road, Eden, WI 53019-1108. ASD. Tel: (920) 477-2521. Fax: (920) 477-7000. Email: <u>marketing@edenstone.net</u>. Web: <u>www.evstone.net</u>.
 - b. Requests for substitutions will be considered in accordance with provisions of Section 00 60 00 PRODUCT REQUIREMENTS.
- 2. VENEER STONE

- a. <u>50% Eden Machine Cut Veneers</u>
 - 1) Split face
 - 2) <u>Color</u>:
 - a) Light Gray
 - Slight Buff:
 - a) Light buff increase slightly as it ages.
 - 4) <u>Lengths</u>:
 - a) Random 8" 36".
 - 5) <u>Heights</u>:
 - a) 80%: 2" 6".
 - b) 20%: 6" 9".
 - 6) <u>Thickness</u>:
 - a) 3/4" 1 1/2".
 - 7) Material shall conform to ASTM 568 with the following properties:
 - a) Maximum absorption rate of 0.40% when tested in accordance with ASTM C97.
 - b) Minimum density of 170lbs/cubic ft. when tested in accordance with ASTM C97.
 - c) Minimum compressive strength of 33,000 psi average when tested in accordance with ASTM C170.
- b. <u>50% Windsor: Eden Seam face</u>
 - 1) <u>Color</u>:
 - a) Casual Medium Golden Brown.
 - 2) <u>Lengths</u>:
 - a) Random 8" 30".
 - 3) <u>Heights</u>:
 - a) 80%: 2" 6".
 - b) 20%: 6" 9".
 - 4) <u>Thickness</u>:
 - a) 3/4" 1 1/2".
 - 5) Material shall conform to ASTM 568 with the following properties:
 - a) Maximum absorption rate of 0.40% when tested in accordance with ASTM C97.
 - b) Minimum density of 170lbs/cubic ft. when tested in accordance with ASTM C97.
 - c) Minimum compressive strength of 33,000 psi average when tested in accordance with ASTM C170.

3. WEEP SYSTEM

- a. <u>Exterior Thin Stone Veneer</u>:
 - 1) Provide complete weep system to separate Natural Thin Veneer from Structural back-up wall and provide means to remove water entering wall from exterior and allow wall to vent properly. Sure Cavity Rainscreen Drainage Plane by Masonry Technology Inc.
 - 2) <u>System Components</u>: Fabricated from plastic extrusions.
 - a) <u>Collection and Drainage Membrane</u>: Corrugated plastic sheet with permeable fabric facing to be placed vertically and continuously behind stone veneer on structural back-up wall.
 - b) <u>Weeps</u>: Cellular plastic material placed at base of stone veneer wall to receive water from collection and drainage membrane and convey it horizontally to weep strips spaced at 16" and penetrating through base mortar bed Model No. 63275 Gray as manufactured by Plastic Components, Inc.
 - c) <u>Material Properties</u>:

- (1) Water vapor transmission tested in accordance with ASTM E96: 13.8 grains per hour per square foot.
- (2) Permeability tested in accordance with ASTM E96: 3.7 perm-inches.
- (3) Compressive strength tested in accordance with ASTM D1621: 30 PSI at 10% strain.
- (4) Flexural breaking load tested in accordance with ASTM D4632:136 pounds minimum.
- (5) Puncture resistance tested in accordance with ASTM D4833: 48.7 pounds.

4. MORTAR MATERIALS

- a. <u>Portland Cement</u>: ASTM C150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
 - 1) <u>Low-Alkali Cement</u>: Not more than 0.60% total alkali when tested according to ASTM C114.
- b. <u>Hydrated Lime</u>: ASTM C207, Type S.
- c. <u>Portland Cement-Lime Mix</u>: Packaged blend of Portland Cement and Hydrated Lime containing no other ingredients.
 - 1) <u>Products</u>: Subject to compliance with requirements, provide one of the following:
 - a) Lafarge North America Inc.; Eaglebond.
 - b) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - c) Mutual Materials Co.; Design Mix Mortar Mix.
- d. Mortar Cement: ASTM C1329.
 - <u>Products</u>: Subject to compliance with requirements, provide the following:
 a) Lafarge North America Inc.; Lafarge Mortar Cement.
 - a) Lalarge North America Inc., Lalarge North
- e. <u>Masonry Cement</u>: NOT PERMITTED
- f. <u>Mortar Pigments</u>: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979. Use only pigments with a record of satisfactory performance in stone masonry mortar.
 - 1) <u>Products</u>: Subject to compliance with requirements, provide one of the following:
 - a) Davis Colors; True Tone Mortar Colors.
 - b) Lanxess Corporation; Bayferrox Iron Oxide Pigments.
 - c) Solomon Colors; SGS Mortar Colors.
- g. <u>Aggregate</u>: ASTM C144 and as follows:
 - 1) For pointing mortar, use aggregate graded with 100% passing No. 16 sieve.
 - 2) <u>Colored Aggregates</u>: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
 - a) Match Architect's sample.
- h. <u>Latex Additive</u>: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland Cement mortar bed, and not containing a retarder.
 - 1) <u>Manufacturers</u>: Subject to compliance with requirements, provide products by one of the following:

- a) Bostik, Inc.
- b) Custom Building Products.
- c) Laticrete International, Inc.
- d) MAPEI Corporation.
- e) ProSpec; Bonsal American; a division of Oldcastle Architectural Products Group.
- i. <u>Cold-Weather Admixture</u>: **Permitted only with written approval of Architect**. Non-chloride, non-corrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1) <u>Products</u>: Subject to compliance with requirements, provide one of the following:
 - a) Euclid Chemical Company (The), RPM International Inc.; Accelguard 80.
 - b) Grace Construction Products, a unit of W. R. Grace & Co. Conn.; Morset.
 - c) Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- j. <u>Water</u>: Potable.

5. ACCESSORIES

- a. <u>Substrate</u>: Reference Section <u>06 10 00 ROUGH CARPENTRY</u> for composite insulated wall sheathing.
- b. <u>Concrete Bonding Agent</u>: Latex type as recommended by Eden Stone Company.
- c. <u>Weather Resistive Barrier</u>: Tyvek.
- d. <u>Expanded Metal Lath</u>: ASTM C847, galvanized, self-furring.
- e. <u>Lath Anchorage</u>: Tie wire, nails, screws and other metal supports, galvanized, of type and size to suit application and to rigidly secure materials in place.
- f. <u>Setting Buttons and Shims</u>: Plastic.
- g. <u>Flashing</u>: Provide aluminum flashings for base of installation, and other locations as detailed on Drawings and reviewed shop drawings and as required to prevent water penetration and provide weather tight, complete, functional natural thin veneer installation.
- h. <u>Sealants</u>: Provide sealants and backing material for perimeter and control joints as detailed on Drawings and reviewed shop drawings and as required to provide weather tight natural thin veneer installation.
 - 1) <u>Type</u>: As specified in Section <u>07 92 00 JOINT SEALANTS</u>: Sealant for perimeter and control joints.

C. EXECUTION

- 1. PREPARATION FOR INSTALLATION
 - a. Coordinate installation of Natural Thin Veneer with installation of other components to ensure timely execution of work and sequencing to ensure sound, attractive, and weather tight exterior wall system.
 - b. Prior to starting installation, inspect project conditions:

- 1) Verify that back-up wall construction is complete, rigid, plumb, and ready to receive stone.
- 2) Verify that door and window openings and other penetrations are accurately located, sized, and adequately prepared for application of Natural Thin Veneer.
- 3) Verify built-in items are properly located and ready for roughing into masonry. Ensure built-in items are free of rust, ice, mud, and other foreign matter and that ferrous items are primed or galvanized.
- 4) Verify that mechanical and electrical services within walls have been installed, tested, and approved.
- c. Report deficiencies to Architect and do not proceed with Natural Thin Veneer installation until all deficiencies have been addressed.

2. INSTALLATION

- a. Install stone and related components as detailed on drawings and reviewed shop drawings, manufacture's instructions, and standards of workmanship as published in ACI530.1/ASCE 6/TMS.
- b. <u>Flashing</u>: Install flashings at base of air cavity, at door and window lintels, window sills, and other locations as detailed on drawings and reviewed shop drawings in accordance with Section <u>07 62 00 SHEET METAL FLASHING AND TRIM</u>.
 - 1) Weep Screed: Model No. G3275
 - a) <u>Color</u>: Gray
 - b) <u>Manufacturer</u>: Plastic Components, Inc.
- c. <u>Weather Resistive Barrier</u>: Install weather resistive barrier on wall substrate in accordance with manufacturer's instructions.
- d. <u>Weep System Installation</u>: Install over weather resistant underlayment of metal stud framed back-up wall with composite insulated wall sheathing. Install in accordance with manufacturer's instructions and reviewed shop drawings.
 - 1) Apply weep system over complete back-up wall. Where sections join, overlap fabric facing.
 - 2) At base of wall anchor weeps by stapling to substrate. Space at 16" minimum and extend out beyond location of Natural Thin Veneer.
- e. <u>Metal Lath Installation</u>: Install in accordance with ASTM C1068. Apply taut with long dimensional horizontal.
 - 1) Anchor metal lath to metal studs with stainless steel fasteners penetrating through sheathing, weep system, and weather resistant underlayment. Space fasteners at 6" minimum vertically and 16" maximum horizontally.
 - 2) Start installation at bottom of wall.
 - 3) Lap horizontal in shingle fashion with minimum 3" overlap.
 - 4) Lap ends 1" minimum. Secure laps with tie wire when they occur between supports.
 - 5) Lap corner installations minimum 16" and securely fasten into adjacent wall stud.
 - 6) Stop lath 1" from finished edges.
- f. <u>Scratch Coat Installation</u>: Apply cement mortar scratch coat in accordance with PCA Plaster (Stucco) Manual.
 - 1) Key into metal lath.
 - 2) Thickness 1/4" behind lath, 1/4" in front of lath.
 - 3) Prior to initial set, scratch horizontally to provide key for bond coat.
 - 4) Allow to cure 20 hours.
 - 5) Slightly dampen scratch coat before installation of Natural Thin Veneer.

- 6) Apply mortar to metal lath in amount that is capable of being worked while mortar is still workable.
- 7) Install Natural Thin Veneer to mortar before initial setup.
- g. <u>Stone Installation</u>:
 - 1) Lay out work in advance and distribute color range and stone uniformity over total work area.
 - 2) <u>Coursing Patterns</u>: Random Ashlar as indicated on Drawings to match approved mock-up. Arrange stone pattern to provide color and uniformity, visual variations, blend of sizes, and regularity and neat appearance of joints. Exercise care to avoid concentration of any one color on any one wall surface. Do not use stacked vertical joints.
 - 3) <u>Mortar Setting</u>: Apply 1/2" bonding mortar to back of Natural Thin Veneer. Ensure complete coverage of back surface. Apply extra bed of mortar around all outside edges of stone. Press and wiggle stone firmly onto wall.
 - a) Work from bottom up.
 - b) Start at corners. Alternate installation of long and short ends of corner units in adjacent courses.
 - c) Isolate top of veneer stone from horizontal structural framing members and slabs or decks with compressible joint filler and sealant in accordance with Section <u>07 92 00 JOINT SEALANTS</u>.
 - 4) <u>Joints</u>: Lay stone with 1/2" approximate mortar joints.
 - a) Fill joints with mortar. Pack and work into voids.
 - b) When thumb-print hard, neatly tool to concave joint with round jointer slightly larger than joint width.
- h. Remove excess mortar as work progresses to prevent staining.
- i. Remove units disturbed after laying, clean, and re-lay with fresh mortar. If adjustments are required, remove units, clean off mortar, and reset with fresh mortar.
- j. Exercise care that wet mortar is not splashed onto stone face during installation. Excess or splashed mortar shall be cleaned from face with dry burlap wipe. Remove excess after mortar becomes hard enough not to smear but prior to mortar setting.
- k. Ensure that sealant materials are not smeared onto stone faces. Remove as recommended by manufacturer.
- I. After installation of Natural Thin Veneer, cut off excess weep materials flush with stone edge.

3. FIELD QUALITY CONTROL

- a. Test mortar and grout in accordance with Section <u>01 40 00 QUALITY CONTROL</u> and ASTM C780.
- b. <u>Testing of Mortar Mix</u>: In accordance with ASTM C780, Annex A4, for mortar aggregate ratio and ASTM C780, Annex A5, for mortar water content.

4. PROTECTION

- a. Protect installed products until completion of project.
- b. Cover the top of unfinished stone masonry work to protect it from the weather.
- c. Touch-up, repair or replace damaged products before substantial completion.

5. CLEANING AND SEALING

- a. Remove excess mortar and mortar smears as work progresses.
- b. Allow walls to air dry. Brush off mortar with stiff fiber brush. Do not use metallic tools for cleaning.
- c. Review <u>www.evstone.net</u> for detailed cleaning if chemicals are required.

04 72 00 - CAST STONE MASONRY

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Section 01 33 01 SUBMITTALS.
 - b. Section 04 42 11 ADHERED STONE MASONRY.
 - c. Section 07 92 00 JOINT SEALANTS
 - d. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u> apply to work of this section.
 - 2. SUMMARY
 - a. Cast Stone window sills and decorative banding integral with brick veneer cavity wall system.
 - b. Units to be mortar set with sealant pointed joints.
 - c. Coordinate installation with Section <u>04 42 11 ADHERED STONE MASONRY.</u>
 - 3. SUBMITTALS
 - a. Comply with Section <u>01 33 01 SUBMITTALS.</u>
 - b. <u>Product Data</u>: Submit manufacturer's detailed technical data including the following:
 - 1) Detailed specifications of construction and fabrication
 - 2) Manufacture's installation instructions
 - c. <u>Shop Drawings</u>: Submit manufacturer's shop drawings including profiles, cross sections, reinforcement, exposed faces, arrangement of joints (optional for standard or semi-custom installations), anchoring methods, anchors (if required), annotation of stone types and their location.
 - d. <u>Samples</u>: Submit pieces of Cast Stone that are representative of the general range of finish and color proposed to be furnished for the project.
 - 1) <u>Size</u>: 8" long cast stone sill and beltcourse to profile shown
 - 2) Sealant samples for each type and color of joint sealant required.
 - e. <u>Warranty</u>: 10 Year warranty.
 - 4. QUALITY ASSURANCE
 - a. <u>Manufacturers Qualifications</u>:
 - 1) Not less than ten (10) years experience in architectural cast stone.
 - b. Installers Qualifications:

- 1) Firm experienced in systems similar in complexity to those required for this project.
- 2) Firm has successfully completed a minimum of five (5) comparable scale projects using this system.
- c. <u>Testing Agency Qualifications:</u>
 - 1) Qualified according to ASTM E 329 for testing indicated.
- d. <u>Source Limitations for Cast Stone:</u>
 - 1) Obtain Cast Stone units through single source from single manufacturer.
- e. Source Limitations for Mortar Materials
 - 1) Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- 5. SUBSTITUTIONS
 - a. Refer to section 01 25 13 PRODUCT SUBSTITUTION PROCEDURES.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. Comply with ASTM C 1364- Standard Specification for Architectural Cast Stone.
 - b. <u>Manufacturer</u>: Subject to compliance with requirements, provide partitions from one of the following manufacturers:
 - 1) Custom Cast Stone, Inc., Westfield, Indiana
 - 2) Edwards Cast Stone, Dubuque, Iowa
 - 3) Precast Specialties, Fort Wayne, Indiana
 - 4) Architectural Precast, Chicago, Illinois
 - 5) Continental Cast Stone, Kansas City, Missouri
- 2. CAST STONE REQUIREMENTS
 - a. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.
 - b. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.
 - c. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1) Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 - 2) Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3) Provide drips on projecting elements unless otherwise indicated.
 - d. <u>Fabrication Tolerances</u>:

- 1) <u>Variation in Cross Section</u>: Do not vary from indicated dimensions by more than 1/8".
- <u>Variation in Length</u>: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8", whichever is greater, but in no case by more than 1/4".
- 3) <u>Warp, Bow, and Twist</u>: Not to exceed 1/360 of the length of unit or 1/8", whichever is greater.
- Location of Grooves, False Joints, Holes, Anchorages, and Similar <u>Features</u>: Do not vary from indicated position by more than 1/8" on formed surfaces of units and 3/8" on unformed surfaces.
- e. <u>Cure Units as follows:</u>
 - 1) Keep units damp and continue curing to comply with one of the following:
 - a) No fewer than six (6) days at mean daily temperature of 60°F or above.
- f. Acid etch units after curing to remove cement film from surfaces to be exposed.
- g. <u>Color and Texture:</u>
 - 1) Provide units with <u>fine-grained texture</u> and <u>buff color</u> resembling Indiana limestone as selected by Architect.

2. MORTAR MATERIALS

- a. <u>Portland Cement</u>: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- b. Provide natural color or white cement as required to produce mortar color indicated.
- c. <u>Hydrated Lime</u>: ASTM C 207, Type S.
- d. <u>Portland Cement-Lime Mix</u>: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- e. <u>Aggregate for Mortar</u>: ASTM C 144.
 - 1) For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2) For joints less than 1/4" thick, use aggregate graded with 100% passing the No. 16 sieve.
- f. <u>Water</u>: Potable.

3. ACCESSORIES

- a. <u>Anchors</u>: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.
- b. <u>Dowels</u>: 1/2" diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

- c. <u>Proprietary Acidic Cleaner</u>:
 - 1) Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces.
 - 2) Use product expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - 3) <u>Manufacturers</u>: Subject to compliance with requirements, provide products by one of the following:
 - a) Diedrich Technologies, Inc.
 - b) EaCo Chem, Inc.
 - c) ProSoCo, Inc.

4. MORTAR MIXES

- a. Do not use admixtures including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless approved by Architect
 - 1) Do not use calcium chloride in mortar or grout.
 - 2) Use portland cement-lime mortar unless otherwise indicated.
- b. Comply with ASTM C 270, Proportion Specification.
 - 1) For setting mortar, use Type N.
 - 2) For pointing mortar, use Type N.

5. SOURCE QUALITY CONTROL

- a. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.
 - 1) Include one test for resistance to freezing and thawing.

C. EXECUTION

- 1. EXAMINATION
 - a. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - b. Proceed with installation only after unsatisfactory conditions have been corrected.

2. SETTING CAST STONE IN MORTAR

- a. Set cast stone as indicated on Drawings.
 - 1) Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 2) Install cast stone in sizes and coursing patterns indicated on drawings and as specified.

- 3) Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
- 4) Coordinate installation of cast stone with installation of flashing specified in other Sections.
- b. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- c. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1) Set units with joints 1/4" to 3/8" wide unless otherwise indicated.
 - 2) Build anchors and ties into mortar joints as units are set.
 - 3) Fill dowel holes and anchor slots with mortar.
 - 4) Fill collar joints solid as units are set.
 - 5) Build concealed flashing into mortar joints as units are set.
 - 6) Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
 - 7) Keep joints at shelf angles open to receive sealant.
- d. Rake out joints for pointing with mortar to depths of not less than 3/4".
 - 1) Rake joints to uniform depths with square bottoms and clean sides.
 - 2) Scrub faces of units to remove excess mortar as joints are raked.
- e. Point mortar joints by placing and compacting mortar in layers not greater than 3/8".
 - 1) Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- f. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- g. Provide sealant joints at copings, window sills, and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.
 - 1) Keep joints free of mortar and other rigid materials.
 - 2) Build in compressible foam-plastic joint fillers where indicated.
 - 3) Form joint of width indicated, but not less than 3/8".
 - 4) Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
 - 5) Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section <u>07 92 00 JOINT SEALANTS</u>.

2. INSTALLATION TOLERANCES

- a. <u>Variation from Plumb</u>: Do not exceed 1/8" in 10', 1/4" in 20', or 1/2" maximum.
- b. <u>Variation from Level</u>: Do not exceed 1/8" in 10', 1/4" in 20", or 1/2" maximum.
- c. <u>Variation in Joint Width</u>: Do not vary joint thickness more than 1/8" in 36" or 1/4 of nominal joint width, whichever is less.
- d. <u>Variation in Plane between Adjacent Surfaces (Lipping</u>): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16", except where variation is due to warpage of units within tolerances specified.

3. ADJUSTING AND CLEANING

- a. Remove and replace stained and otherwise damaged units and units not matching approved Samples.
 - 1) Cast stone may be repaired if methods and results are approved by Architect.
- b. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- c. <u>In-Progress Cleaning</u>: Clean cast stone as work progresses.
 - 1) Remove mortar fins and smears before tooling joints.
 - 2) Remove excess sealant immediately, including spills, smears, and spatter.
- d. <u>Final Cleaning</u>: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1) Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2) Test cleaning methods on sample; leave one sample uncleaned for comparison purposes.
 - a) Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
 - Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4) Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5) Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

05 50 00 - METAL FABRICATIONS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, including Section <u>00 72 00</u> <u>GENERAL CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to this section.
 - 2. WORK INCLUDED
 - a. Work of this Section includes all labor, materials, equipment and services necessary to complete the miscellaneous metal work as indicated on the drawings and specified herein, including but not limited to, the following:
 - 1) Rough Hardware.
 - 2) Loose Steel Lintels and Bearing Plates.
 - 3) Sleeves in Concrete Walls and Slabs.
 - 4) Steel framing, bracing, supports, anchors, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this Section.
 - 5) Floor Edge and Toe Guard.
 - 6) Wire Mesh
 - 7) Prime painting, touch-up painting, galvanizing and separation of dissimilar metals for work of this Section.
 - 8) Cutting, fitting, drilling and tapping work of this Section to accommodate work of other Sections and of concrete, masonry or other materials as required for attaching and installing work of this Section.
 - 3. RELATED WORK
 - a. Section 09 91 00 PAINTING.
 - b. Section <u>09 21 16 GYPSUM BOARD ASSEMBLIES</u> for wood stud framing for gypsum drywall partitions.
 - 4. QUALITY ASSURANCE
 - a. <u>Field Measurements</u>:
 - 1) Take field measurements prior to preparation of shop drawings and fabrication, where possible.
 - 2) Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.
 - b. <u>Shop Assembly</u>:
 - 1) Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly.
 - 2) Disassemble units only as necessary for shopping and handling limitations.
 - 3) Clearly mark units for re-assembly and coordinated installation.

- c. <u>Reference Standards</u>: The work is subject to requirements of applicable portions of the following standards:
 - 1) "Manual of Steel Construction", American Institute of Steel Construction.
 - 2) AWS D1-1 "Structural Welding Code", American Welding Society.
 - 3) SSPC SP-3 "Surface Preparation Specification No. 3, Power Tool Cleaning", Steel Structures Painting Council.
 - 4) SSPC PA-1 "Painting Application Specification", Steel Structures Painting Council.
 - 5) "Handbook on Bolt, Nut and Rivet Standards", Industrial Fasteners Institute.
- 5. SUBMITTALS
 - a. <u>Manufacturer's Literature</u>: Submit manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.
 - b. <u>Shop Drawings</u>:
 - 1) Shop drawings for the fabrication and erection of all assemblies of miscellaneous iron work, which are not completely shown by manufacturer's data sheets.
 - 2) Include plans and elevations at not less than 1" to 1'-0" scale and include details of sections and connections at not less than 3" to 1-0" scale.
 - 3) Show anchorage and accessory items.
 - c. Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous).
 - 1) Auxiliary views shall be shown to clarify all welding.
 - 2) Notes such as 1/4" weld, weld and tack weld are not acceptable.

B. PRODUCTS

- 1. MATERIALS
 - a. <u>Metals</u>:
 - 1) <u>Metal Surfaces, General:</u> For fabrication of miscellaneous metal work, which will be exposed to view, use only materials, which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - 2) <u>Steel Plates, Shapes and Bars</u>: ASTM A36.
 - 3) <u>Steel Bar Grating</u>: ASTM A569 or ASTM A36.
 - 4) <u>Steel Tubing</u>: Cold formed, ASTM A500; or hot rolled, ASTM A501.
 - 5) <u>Structural Steel Sheet</u>: Hot rolled, ASTM A570; or cold rolled, ASTM A611,
 - Class 1; of grade required for design loading.
 - 6) <u>Galvanized Structural Steel Sheet</u>: ASTM A446, of grade required for design loading.
 - a) Coating designation as indicated, or if not indicated, G90.
 - 7) <u>Steel Pipe</u>: ASTM A53, type and grade as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.
 - 8) <u>Gray Iron Castings</u>: ASTM A48, Class 30.
 - 9) <u>Malleable Iron Castings</u>: ASTM A47, grade as selected by fabricator.
 - 10) <u>Brackets, Flanges and Anchors</u>: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- 11) <u>Concrete Inserts</u>: Threaded or wedge type: galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- 12) <u>Stainless Steel</u>: Conform to ASTM A-554, grade MT 304, No. 4 finish.
- b. <u>Grout:</u> Non-shrink, non-metallic grout conforming to the requirements of Section 03300.
- c. <u>Fasteners</u>:
 - 1) <u>General</u>: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
 - 2) <u>Bolts and Nuts</u>: Regular hexagon head type, ASTM A307, Grade A.
 - 3) Lag Bolts: Square head type, FS FF-B-561.
 - 4) <u>Machine Screws</u>: Cadmium plated steel, FS FF-S-92.
 - 5) <u>Plain Washers</u>: Round, carbon steel, FS FF-W-92.
 - 6) <u>Masonry Anchorage Devices</u>: Expansion shields, FS FF-S-325.
 - 7) <u>Toggle Bolts</u>: Tumble-wing type, FS FF-B-588, type, class and style as required.
 - 8) <u>Lock Washers</u>: Helical spring type carbon steel, FS FF-W-84.
- d. <u>Shop Paint</u>: Shop prime all non-galvanized miscellaneous metal items using series 88 Azeron Primer made by Tnemec or No. 230R55 "Rust Barrier" made by Con-Lux.
- e. <u>Bituminous Paint</u>: Fed. Spec. TT-C-494.
- f. <u>Galvanize Repair Coating</u>: For touching up galvanized surfaces after erection, provide Z.R.C. Cold Galvanizing Compound made by Z.R.C. Chemical Products Co.

2. PRIME PAINTING

- a. <u>Scope</u>: All ferrous metal (except galvanized steel) shall be cleaned and shop painted with one coat of specified ferrous metal primer.
 - 1) No shop prime paint required on galvanized steel or aluminum work.
- b. <u>Cleaning:</u> Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning: for cleaning of ferrous metals which are to receive shop prime coat."
- c. <u>Application</u>:
 - 1) Apply shop prime coat immediately after cleaning metal.
 - 2) Apply paint in dry weather or under cover.
 - 3) Metal surfaces shall be free from frost or moisture when painted.
 - 4) Paint all metal surfaces including edges, joints, holes, corners, etc.
 - 5) Paint surfaces, which will be concealed after shop assembly prior to such assembly.
 - Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.
 - 6) Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness.

- d. <u>Touch-Up</u>: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.
- e. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection.
 - 1) Change color of second coat to distinguish it from the first.

3. GALVANIZING

- a. <u>Scope</u>: All ferrous metal exposed to the weather, and all ferrous metals indicated on drawings or in specifications to be galvanized, shall be cleaned and then hotdipped galvanized after fabrication.
- b. <u>Cleaning</u>: Thoroughly clean metal surfaces of all mill scale, rust, dirt, grease, oil, moisture and other contaminants prior to galvanizing.
- c. <u>Application</u>: Hot-dip galvanizing shall be applied in accordance with:
 - 1) ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2) ASTM A153: Galvanized Coating on Iron and Steel Hardware Table 1.
 - 3) ASTM A446: Galvanized Coating on Steel Sheets.
 - 4) Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.
- d. Fabricate joints, which will be exposed to weather in a manner to exclude water or provide, weep holes where water may accumulate.
- e. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the weight of the coating, and the appropriate ASTM number.
- f. To minimize surface imperfection (e.g.: flux inclusions), material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride (pre-flux) immediately prior to galvanizing.
 - 1) The type of galvanizing process utilizing a flux blanket overlaying the molten zinc will not be permitted.
- g. After galvanizing, all materials not exposed to view must be chromated by dipping material in a 0.2% chromic acid solution.
- h. Galvanized surfaces, where exposed to view, must have a smooth, level surface finish.
 - 1) Where this does not occur, piece shall be rejected and replaced to the acceptance of the Architect.

4. PROTECTIVE COATINGS

- a. Whenever dissimilar metals will be in contact, separate contact surfaces by coating each contact surface prior to assembly or installation with one coat of specified bituminous paint, which shall be in addition to the specified shop prime paint.
- b. Mask off those surfaces not required to receive protective coating.

5. WORKMANSHIP

- a. <u>General</u>:
 - 1) Miscellaneous metal work shall be fabricated by an experienced fabricator or manufacturer and installed by an experienced tradesman.
 - 2) Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
 - 3) All work shall be accurately and neatly fabricated, assembled and erected.
- b. <u>Shop Assembly</u>:
 - 1) Insofar as practicable, fitting and assembly of work shall be done in shop.
 - 2) Shop assembled work in largest practical sizes to minimize field work.
 - 3) It is the responsibility of the miscellaneous metal subcontractor to assure himself that the shop-fabricated miscellaneous metal items will properly fit the field condition.
 - 4) In the event that shop-fabricated miscellaneous metal items do not fit the field condition, the item shall be returned to the shop for correction.
- c. <u>Cutting</u>:
 - 1) Cut metal by sawing, shearing, or blanking.
 - 2) Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges.
 - 3) Make cuts accurate, clean, sharp and free of burrs, without deforming adjacent surfaces or metals.
- d. <u>Holes</u>: Drill or cleanly punch holes; do not burn.
- e. <u>Connections</u>:
 - 1) Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to weather.
 - 2) Locate joints where least conspicuous.
 - 3) Unless indicated otherwise, weld or bolt shop connections; bolt or screw field connections.
 - 4) Provide expansion and contraction joints to allow for thermal movement of metal at locations and by methods approved by Architect.
 - 5) <u>Welding</u>:
 - a) Shall be in accordance with "Standard Code for Welding in Building Construction" of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.
 - b) Welds shall be continuous, except where spot welding is specifically permitted.
 - c) Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
 - d) All welds on or behind surfaces, which will be exposed to view, shall be done so as to prevent distortion of finished surface.

- e) Remove weld spatter and welding oxides from all welded surfaces.
- f. <u>Bolts and Screws</u>: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.
- g. <u>Operating Mechanism</u>: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
- h. <u>Built-In Work</u>: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this section of the specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
- i. <u>Supplementary Parts</u>: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- j. <u>Coordination:</u> Accurately cut, fit, drill and tap work of this section to accommodate and fit work of other trades.
 - 1) Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
- k. Exposed Work:
 - 1) In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, butts, and other defects which mar appearance of finished work.
 - 2) Metal work exposed to view shall be straight and true to line or curve, smooth arises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.
 - 3) Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.

6. MISCELLANEOUS METALS ITEMS

- a. <u>Rough Hardware</u>:
 - 1) Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.
 - 2) Straight bolts and other stock rough hardware items are specified in Division <u>6 WOOD, PLASTICS AND COMPOSITES</u>.
 - 3) Fabricate items to sizes, shapes and dimensions required.
 - 4) Furnish malleable iron washers for heads and nuts which bear on wood connections; elsewhere, furnish steel washers.
- b. <u>Loose Steel Lintels</u>:
 - 1) Unless otherwise shown or noted, provide loose structural steel lintels

for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated.

- 2) Provide not less than 8" bearing at each side of openings, unless otherwise indicated.
- c. <u>Miscellaneous Light Steel Framing</u>:
 - 1) Light steel framing, bracing, supports, framing, clip angles, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings and details or as required to suit the condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and all other connecting and adjoining work.
 - 2) All light steel framing steel shall be furnished and erected in accordance with the applicable requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction and as specified herein.
- d. <u>Steel Gratings and Frames</u>:
 - 1) Provide hot dipped galvanized steel gratings complying with FS RR-G-661 with rectangular cross bars welded to bearing bars. See structural drawings for sizes and locations.
 - 2) <u>Manufacturer:</u> Provide gratings manufactured by Reliance, Borden, Irving Subway Grating, or approved equal.
 - 3) <u>Hinged Section</u>: Provide hinged sections in area way gratings where required by the drawings.
 - a) Each hinged section up to 4'-0" wide shall be provided with two
 (2) five knuckle, fast pin, regular weight, plain bearing, wrought bronze butt hinges.
 - b) Each hinged section over 4'-0" wide shall be provided with three (3) butt hinges.
 - 4) Furnish grating frames, with corners mitered, welded and ground smooth, and with welded-on straps for secure anchorage into concrete. Frames and anchors to be galvanized.
- e. <u>Sleeves in Concrete Walls and Slabs</u>:
 - 1) Sleeves through concrete walls shall be of Schedule 40 steel pipe with i.d. 2" larger than o.d. of pipe or conduit (including insulation, if any) to be accommodated.
 - 2) Sleeves shall project 1/2" on each side of finished wall.
 - 3) Provide rectangular 1/4" steel plate collar at center, continuously welded to the perimeter of the sleeve, and 6" wider than the o.d.
 - 4) Slots in slabs shall be 12-gauge steel sheet, galvanized, of dimensions indicated, with strap anchors welded in place not more than 12" on centers.

C. EXECUTION

- 1. INSPECTION
 - a. Examine the areas and conditions where miscellaneous metal is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work.
 - b. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

2. ERECTION

- a. <u>Fastening to In-Place Construction</u>: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- b. <u>Cutting, Fitting, and Placement</u>:
 - 1) Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications.
 - 2) Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
 - 3) Provide temporary bracing or anchors in formwork for items, which are to be built into concrete, masonry, or similar construction.
- c. <u>Fitting Connections</u>:
 - 1) Fit exposed connections accurately together to form tight hairline joints.
 - 2) Weld connections, which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 - 3) Grind exposed joints smooth and touch up shop paint coat.
 - 4) Do not weld, cut or abrade the surfaces of exterior units, which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- d. <u>Field Welding</u>: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance, and quality of welds made, and methods used in correcting welding work.
- e. <u>Touch-Up Painting</u>:
 - 1) Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
 - 2) Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- f. <u>Field Touch-Up of Galvanized Surfaces</u>:
 - 1) Touch-up shop applied galvanized coatings damaged during handling and installation.
 - 2) Use galvanizing repair coating specified herein for galvanized surfaces.

END OF SECTION

05 52 00 - METAL HANDRAILS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to this section.

2. SUMMARY

- a. <u>This Section includes the following</u>:
 1) Steel Handrails
- b. <u>Related Sections</u>: The following Sections contain requirements that relate to this Section.
 - 1) Section <u>09 91 00 PAINTING</u> for finish paint systems for exterior pipe railings and interior railing and steel stairs.

3. PERFORMANCE REQUIREMENTS

- a. <u>Structural Performance of Handrails and Railing Systems</u>: Engineer, fabricate, and install handrails to comply with requirements of ASTM E 985 for structural performance based on the following:
 - 1) Testing performed according to ASTM E 894 and E 935.
 - 2) Design handrails and railing systems to comply with loading conditions required by the current Indiana Building Code.

4. SUBMITTALS

- a. <u>General</u>: Submit each item in this Article according to the Conditions of the Contract and Division <u>1 GENERAL REQUIREMENTS</u> specification sections.
- b. Product data for metal stairs, pre-filled metal pan stair treads, no-slip aggregates and no-slip aggregate surface finishes, paint products, and grout.
- c. Shop Drawings detailing fabrication, and installation of steel stairs and railings. Include plans, elevations, sections, and details of steel stairs and their connections.
 - 1) Show anchorage and accessory items.
 - 2) For installed steel stairs deigned to comply with design loadings contained in the Indiana Building Code, Shop drawings shall be sealed and signed by qualified professional engineer registered in the State of Indiana.
- d. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

5. QUALITY ASSURANCE

a. <u>Fabricator Qualifications</u>: Firm experienced in producing steel stairs and railings

similar to those indicated for this Project with a record of successful in-service performance and with sufficient production capacity to produce required units without delaying the Work.

- b. <u>Installer Qualifications</u>: Installer experienced in erection of steel stairs in projects and installation conditions similar to this project.
- c. <u>Engineer Qualifications</u>: A professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of metal stairs (including handrails and railing systems) similar to this Project in material, design, and extent and that have a record of successful in-service performance.
- d. <u>Welding Standards</u>: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
 - 1) Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- e. Design, materials, connection details etc. shall comply with current edition of NAAMM Metal Stairs Manual.

B. PRODUCTS

- 1. DESCRIPTION
 - a. Provide Steel Handrails as detailed on the drawings.
- 2. FERROUS METALS
 - a. <u>Metal Surfaces, General</u>:
 - 1) For surfaces exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes.
 - 2) Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, roughness, or, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
 - b. <u>Steel Plates, Shapes, and Bars</u>: ASTM A36.
 - c. <u>Steel Tubing</u>: Product type:

1)

- Cold-Formed Steel Tubing: ASTM A500.
 - a) For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A53.
- d. <u>Rolled Steel Floor Plate</u>: ASTM A 786.
- e. <u>Un-coated Structural Steel Sheet</u>: Product Type, quality and grade as follows: 1) <u>Cold-Rolled Structural Steel Sheet</u>: ASTM A 611, grade as follows:
 - <u>Cold-Rolled Structural Steel Sheet</u>: ASTM A 611, grade as follows: a) Grade A, unless otherwise indicated or required by design
 - loading.
- f. <u>Uncoated Steel Sheet:</u> Commercial quality, product type (method of manufacture) as follows:
 - 1) <u>Cold-Rolled Steel Sheet</u>: ASTM A366.

- g. <u>Welding Rods and Bare Electrodes</u>: Select according to AWS specifications for the metal alloy to be welded.
- 3. PAINT
 - a. <u>Shop Primer for Ferrous Metal</u>: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- 4. FABRICATION-GENERAL
 - a. Form railings from materials of size, thickness, and shapes indicated, but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.
 - b. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 - c. Shear and punch metals cleanly and accurately.
 - d. Remove sharp or rough areas on exposed surfaces.
 - e. Ease exposed edges to a radius of approximately 1/32", unless otherwise indicated.
 - f. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - g. Weld corners and seams continuously to comply with the following:
 - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2) Obtain fusion without undercut or overlap.
 - 3) Remove welding flux immediately.
 - 4) At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and welded surface matches contours of adjoining surfaces.
 - h. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.
 - 1) Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.
 - 2) Locate joints where least conspicuous.
 - i. <u>Shop Assembly</u>:
 - 1) Pre-assemble in shop to greatest extent possible to minimize field splicing and assembly.
 - 2) Use connections that maintain structural value of joined pieces.
 - 3) Clearly mark units for field assembly and coordinated installation.
 - j. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
 - k. <u>Steel Pipe Handrails and Railing Systems</u>:

- 1) <u>General</u>: Fabricate pipe handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.
- 2) Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
- 3) At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to which end is joined, and weld all around.
- 4) Form changes in direction of handrails and rails by flush radius bends.
- 5) Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- 6) Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

5. BRACKETS, FLANGES, FITTINGS AND ANCHORS

- a. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of handrails and railing systems to other work.
- b. Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work.
 - 1) Connect railing posts to stair framing by direct welding, unless otherwise indicated.
- c. <u>Fillers</u>:
 - 1) Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports.
 - 2) Size fillers to suit wall finish thickness.
 - 3) Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.
- d. For galvanized handrails and railing systems, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- e. For non-galvanized steel handrails and railing systems, provide non-galvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- 6. FINISHES
 - a. <u>General</u>: Finish metal stairs after assembly.
 - b. <u>Galvanizing</u>: Hot-dip galvanize items indicated to be galvanized to comply with applicable standard listed below:
 - 1) ASTM A153 for galvanizing iron and steel hardware.
 - c. <u>Preparation for Shop Priming</u>: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed units:

- 1) Interiors (SSPC Zone 1A): SSPC SP 3 "Power Tool Cleaning."
- d. Apply shop primer to uncoated surfaces, except those with galvanized finish or those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated.
 - 1) Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

C. EXECUTION

- 1. PREPARATION
 - a. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, weld plates, and anchor bolts.
 - b. Coordinate delivery of such items to Project site.
- 2. INSTALLATION-GENERAL
 - a. <u>Fastening to In-Place Construction</u>: Provide anchorage devices and fasteners where necessary for securing steel stairs to in-place construction; include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors as required.
 - b. <u>Cutting, Fitting, and Placement</u>:
 - 1) Perform cutting, drilling, and fitting required for installing steel stairs.
 - 2) Set units accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
 - c. Install steel stairs by welding stair framing to steel structure or to weld plates cast into concrete, except where otherwise indicated.
 - d. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
 - e. Fit exposed connections accurately together to form hairline joints.
 - 1) Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations.
 - 2) Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted field connections.
 - f. <u>Field Welding</u>: Comply with the following requirements:
 - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2) Obtain fusion without undercut or overlap.
 - 3) Remove welding flux immediately.
 - 4) At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- 3. INSTALLING STEEL PIPE RAILINGS AND HANDRAILS
 - a. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints.

- b. Space posts at spacing indicated or, if not indicated, as required by design loadings.
 - 1) Plumb posts in each direction.
 - 2) Secure posts and railing ends to building construction as follows:
 - a) Anchor posts to steel by welding directly to steel supporting members.
 - b) Anchor handrail ends into concrete and masonry with steel, round flanges welded to rail ends and anchored into wall construction with drilled-in expansion anchors.
- c. Secure handrails to wall with wall brackets and end fittings.
 - 1) Provide bracket with 1-1/2" clearance from inside face of handrail and finished wall surface.
 - 2) Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 3) Secure wall brackets and wall return fittings to building construction as follows:
 - a) Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - b) Use type of bracket with predrilled hole for exposed bolt anchorage.
 - 4) For concrete and solid masonry anchorage, use drilled-in expansion anchor.
 - 5) For hollow masonry anchorage, use toggle bolts having square heads.
 - 6) For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

4. ADJUSTING AND CLEANING

- a. <u>Touchup Painting</u>: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
- b. <u>Touchup Painting</u>: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on steel stairs are specified in Section <u>09 91 00 PAINTING</u>.
- c. For galvanized surfaces, clean welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

06 10 00 - ROUGH CARPENTRY

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing and installing all framing, roof and insulated wall sheathing, furring, blocking and metal fastenings as shown on the drawings and as required for the work specified.
 - b. <u>Job Requirements</u>: Provide all furring and blocking for fascia, gravel stops, hardware, light fixture mounting, electrical raceway mountings, gypsum wallboard, siding and accessories, etc.
 - c. Lumber must be sound, thoroughly seasoned, well manufactured and free from a warp that cannot be corrected in process of bridging or nailing.
 - d. Woodwork exposed to view on outside of building or in finished interior spaces shall be dressed, unless noted otherwise.

B. MATERIALS

- 1. FRAMING AND ROUGH CARPENTRY
 - a. All lumber shall be grade-stamped by an agency certified by the Board of Review of the American Lumber Standards Committee as of 1991.
 - b. Lumber shall be graded as follows:
 - Interior and Exterior Load Bearing and Non-Load Bearing 2 x 4 Wall <u>Framing (Less Than 8' Long)</u>: Stud Grade "SPF" (Spruce/Pine/Fir) with moisture content not exceeding 19%.
 - a) Studs installed vertically shall be finger jointed.
 - 2) Interior and Exterior Load Bearing and Non-Load Bearing Wall Framing 2 x 6 and Larger and 2 x 4, 8' or Longer:
 - a) <u>Upper Floor bearing walls and non-bearing walls</u>: No. 2 or Better "SPF" (Spruce/Pine/Fir) with moisture content not exceeding 19%. Studs installed vertically shall be finger jointed.
 - b) <u>Ground Floor Bearing Walls</u>: No. 2 Dense or Non-Dense Southern Yellow Pine (SYP) with moisture not exceeding 19%
 - 3) <u>Wall Plates, Blocking and Furring</u>: No. 1/2 "SPF" (Spruce/Pine/Fir) with moisture content not exceeding 19%.
 - 4) <u>Structural Framing Members (Rafters, Joists, Wall Framing Members,</u> <u>Headers & Beams Over 10' long, etc.)</u>: So. Pine. No. 2.
 - a) Refer to drawings for requirements of structural members noted which may differ from those specified herein.
 - b) In case of discrepancies, the larger specified value will govern.
 - 5) Laminated Veneer Lumber (LVL):
 - a) Shall be Microllam as manufactured by:
 - (i) Weyerhaeuser Corporation
 - (ii) Or Architect approved equal.
 - b) Properties of LVL shall be: E = 2,000,000 psi, Fb = 2,600 psi, Fv = 285 psi. Sizes shall be as noted on drawings.
 - 6) <u>Parallel Strand Lumber (PSL)</u>: Shall be Parallam Columns as manufactured by:

- a) Weyerhaeuser Corporation
- b) Or Architect approved equal.
- c) Properties of PSL shall be: $E = 1.8 \times 10^6$ PSI, Fb = 2,800 PSI, Fv = 190 PSI. Sizes shall be as noted on drawings.
- Floor Trusses: Where floor trusses are used in place of joists they shall conform to the requirements in Section <u>06 17 53</u> SHOP FABRICATED WOOD TRUSSES.

2. WOOD PRESERVATIVES

- a. All wood in or in contact with masonry and concrete (except interior wall plates) or exposed to moisture shall be pressure treated in accordance with Standard Specifications of American Wood Preserver's Association for treating structural timbers.
- b. For members below grade, retention to be 0.60, and for members at or above grade, retention to be 0.40.

3. METAL FASTENERS

- a. Nails, spikes, screws, bolts and similar items shall be of sizes and types to rigidly secure members in place.
- b. All connections to be made in such a manner so that the full strength of the structural members being connected may be utilized.
- c. <u>Multi-Story Hold Down Components:</u> Shall be by CLP Systems or equal.
 - 1) Foundation anchors to be set into Powers Fasteners Pure 110+ Epoxy Injection Adhesive Anchorage System or equal by Hilti.
- d. <u>Offset Topmount Joist Hangers</u>: Utilize Simpson "HUSC" or "HUC210-2" hangers.
- e. <u>Miscellaneous Hangers, Hold Downs & Ties</u>: Simpson, model numbers and locations as noted on the drawings.

4. SHEATHING

- a. <u>Exterior Wall Sheathing</u>: 7/16" (or otherwise as noted on the drawings) OSB (Oriented Strand Board) PS2 with butt joints.
- b. <u>Composite Insulating Wall Sheathing</u>: Oriented-strand-board Exposure 1 sheathing 7/16 inch thick, with factory-laminated water-resistive barrier exterior facer, and with rigid foam plastic insulating board laminated to interior face.
 - 1) <u>Basis of Design Product</u>: Provide Huber Engineered Woods LLC; Zip System R Sheathing.
 - 2) <u>Span Rating and Performance Category of Sheathing Layer:</u> Not less than 24/16; 7/16 Performance Category.
 - 3) <u>Thickness</u>: 2"
 - 4) Thermal Resistivity (R Value 9.6 deg F x h x sq. ft./BTU x in. at 75 deg F
 - 5) <u>Edge Profile:</u> Square edge.
 - 6) <u>Exterior Facer:</u> Medium-density; phenolic-impregnated polymermodified sheet material meeting requirements for ASTM D779 Grade D weather-resistive barrier in accordance with ICC AC38 and AC310, with

fastener spacing symbols in exterior facer for 16" in center spacing, with the following characteristics:

- a) Water Resistance of Coatings, ASTM S2247: Pass 14-day exposure test.
- b) <u>Moisture Vapor Transmission, ASTM E96</u>: Not less than 12 perms.
- c) Water Penetration, ASTM E331: Pass at 2.86 lbf/dt.
- d) Wind Driven Rain, TAS-100: Pass
- e) <u>Accelerated Weathering, ASTM G154</u>: Pass
- 7) Fasteners:
 - a) <u>Fasteners, General</u>: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
 - b) <u>Corrosion Resistance</u>: Hot-dipped zinc coating, ASTM A153/A 153M.
 - c) <u>Nails, Brads and Staples</u>: ICC AC 116 and ICC AC201.
 - d) <u>Power Driven Fasteners</u>: ICC-ES-1539 or NER-272.
 - e) <u>Wood Screws</u>: ASME B 18.6.1.
- 8) <u>Sheathing Joint and Penetration Treatment Material:</u>
 - a) <u>Self-Adhering Seam and Flashing Tape</u>: Pressure-sensitive, selfadhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting ICC AC148.
 - (i) <u>Basis of Design Product</u>: Provide Huber Engineered Woods; Zip System Tape.
 - (aa) <u>Thickness</u>: 0.012".
- c. <u>Floor Sheathing</u>: APA 48/24 3/4" or 23/32" rated T & G sheathing, PS 1 EXT.
- d. <u>Roof Sheathing 23/32"</u>: APA 24/16, EXP 1 OSB with butt joints. Roof sheathing shall comply with APA PRP 108, Performance Standards and Policies for Structural Use Panels.
- e. <u>Shear Wall Sheathing</u>: Shall be 3/8" plywood or OSB APA 24/16 sheathing rated exposure 1 with butt joints.
- f. <u>Draftstop Sheathing</u>: Thermo-ply Structural Sheathing "Red" as manufactured by OX Engineered Products.
- 5. WINDOW SILL ADHESIVE
 - a. "Nail Power Premium Quality Construction Panel Adhesive" as manufactured by:
 - 1) Magic Seal Corporation
 - 2) Or Architect approved equal
- 6. SUBFLOOR ADHESIVE
 - a. "Nail Power Subfloor Construction Adhesive" as manufactured by Magic Seal Corporation or Architect approved equal.
- 7. ANCHOR CLIPS, ETC.
 - a. Provide and install the following nail stoppers to help prevent nails from piercing water piping and electrical lines.

- b. Install over utilities that pass through framing members.
- c. 16- gauge steel, galvanized, Install with 8d commons nails or prongs.
 - 1) <u>Styles</u>: PSPN58, NS, NSP manufactured by Simpson Strong-Tie.
- d. Provide and install the following stud shoes to reinforce stud notched framing members for all locations where plumbing, mechanical, or electrical lines are installed.
 - 1) Size according to members. 18-gauge, galvanized.
 - 2) <u>Styles</u>: HSS, SS, RPS.
- 8. FIBERGLASS COLUMNS
 - a. Shall be manufactured by Chadsworth Incorporated, Wilmington, North Carolina, or Architect approved equal.
 - 1) "Tuscan Style" pultruded fiberglass columns.
 - 2) Design No. 700S-5
 - 3) <u>Load Bearing</u>:
 - a) Capacity: 7,500 lbs.
 - 4) 2" x 12"
 - 5) Plain.
 - 6) Squared.
 - 7) Non-Tapered.
 - 8) Polyurethane.
 - 9) "Tuscan Style" Base
 - 10) Molding/Plinth.

9. WORKMANSHIP

- a. Framing and Rough Carpentry:
 - 1) All framing shall be spaced 16" o.c. unless noted otherwise on the drawings.
 - 2) Provide double studding at each side of openings and provide headers over openings as required.
 - 3) Provide all nailing strips and blocking embedded in or attached to concrete and masonry as conditions required.
 - 4) Provide all blocking shown attached to structural steel, concrete and masonry as conditions require for application of sheathing, enclosures and related items.
 - 5) Plates attached to steel beams or columns shall be secured with 1/2" bolts, spaced 48" o.c.
 - 6) Provide all framing, blocking, furring, etc., for interior finish, counters, shelving partitions, etc., and for all other trades, all as detailed, required and/or directed.
 - 7) To be installed in a substantial manner, well-spiked, screwed or bolted together.
 - 8) Coordinate shear wall stud layout with multi-story hold down installation.
 - 9) Perimeter wall plates to be securely anchored to foundation walls using Simpson anchors.
 - a) Anchors to occur 12" from all corners and plate ends and at intermediate points as noted on the drawings.
 - b) Reference Section <u>07 21 00 BUILDING THERMAL INSULATION</u> for wall plate insulation requirements.

- 10) Floor sheathing with butt joint construction shall be installed with joint spacing of 1/8" or less.
 - a) All joints greater than 1/8" shall be filled so as to provide a solid substrate for installation of lightweight concrete.
 - b) Reference Section 03 54 00 GYPSUM CONCRETE.
- 11) Roof sheathing to be installed with clips along "long" joints.
- 12) Where plumbing, heating or other piping is placed in or partly in a partition or wall requiring cutting of plates, a metal tie of appropriate size shall be fastened to the plates across the opening.
 - a) No cutting of top plates at bearing walls will be allowed without specific authorization from Architect.
- 13) Interior partition bracing shall be steel T strip wind bracing as manufactured by Troy Steel Corporation.
 - a) Place at interior partition framing panels which are not anchored at both ends to resist racking.
 - b) Bracing to run 45°.
- 14) Strictly follow manufacturer's printed recommendations for the installation of blocking, bridging, etc. for floor trusses.
 - a) <u>Do not cut, drill or notch</u> the top or bottom chords of the floor trusses or LVL members.
 - b) Where multiple LVL members are used, follow manufacturer's recommendations for nailing.

10. INSULATING COMPOSITE WALL SHEATHING INSTALLATION

- a. Install sheathing panels in accordance with manufacturer's written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.
- b. <u>Air and Moisture Barrier</u>: Coordinate sheathing installation with flashing and joint sealant installation and with adjacent building air and moisture barrier components to provide complete, continuous air-and moisture-barrier.
- c. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports. Install cut panel edges adjacent to uncut panels with remaining sheathing reveal or to outside corner.
- d. Install panels with laminated facer to exterior.
- e. Stagger end joints of adjacent panel runs.
- f. Attach sheathing panels securely to substrate with manufacturer approved fasteners in compliance with the following:
 - 1) IBC: Table 2304.9.1 Fastening Schedule
 - 2) Fastener spacing shall be in accordance with the structural drawings.
- g. Apply seam tape at all panel seams, penetrations, and facer defects or cracks to form continuous weathertight surface.
 - 1) Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.

END OF SECTION

06 17 53 – SHOP FABRICATED WOOD TRUSSES

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing and erecting all wood trusses and joists and all glue-laminated structural units including bracing and bridging, reinforcement, connection materials, etc. as shown on the drawings, as herein specified and/or as required for a complete job.

2. SHOP DRAWINGS AND STRUCTURAL CALCULATIONS

- a. This Contractor shall furnish complete shop drawings and erection drawings showing all components.
- b. The shop drawings shall include a copy of the structural design calculations stamped and certified by an Architect or Engineer registered in the State of Indiana.
- c. The fabricator shall be responsible for the design of all members.
 - 1) Design in accordance with all applicable state and local building codes and regulations.
 - 2) Design members for all dead, live and suspended loads as noted on the drawings.
 - 3) Coordinate with the Architect for connections and details.
 - 4) Sizes of prefabricated members shown on the drawings are for architectural purposes and are not to be construed to mean they are sized for structural adequacy.
 - 5) Fabricator must immediately notify Architect if sizes shown are insufficient to meet the design criteria.
- d. Shop drawings shall also include bracing and bridging and installation instructions. Obtain Architect's approval prior to fabricating any materials or proceeding with the work.

3. DESIGN REQUIREMENTS

- a. All members shall be designed in accordance with live and dead loads as shown on the drawings using allowable properties for the materials in accordance with AITC Specification No. 117 for dry conditions of use.
- b. <u>Deflection Criteria</u>:
 - Floor Trusses (E = 1.9 x 10⁶ psi minimum) Maximum live load deflection = L/480 Maximum total deflection = L/360 Maximum live load deflection over doors and windows = 1/2"
 <u>Roof Trusses</u> Maximum live load deflection = L/360 Maximum total deflection = L/240
 - Maximum live load deflection over doors and windows = 1/2"
- c. <u>Camber</u>:

- 1) Camber all beams and floor trusses for 1.5 times the dead load deflection.
- 2) Camber all roof trusses for total dead load deflection plus 1/2 live load deflection.
- 3) Tolerance on camber shall be $1/4"\pm$.

4. STANDARDS

- a. <u>Wood Trusses</u>: Truss girders and roof trusses shall be as shown on the drawings.
- b. Units are to be manufactured in strict accordance with the manufacturer's printed details and as approved by the TPI design specifications for metal plate connected wood trusses and NFPA NDS.
- 5. PRODUCT DELIVERY, STORAGE AND HANDLING
 - a. All component parts shall be packaged and so labeled as to indicate the parts enclosed according to the nomenclature on the erection drawings.
 - b. Ship, receive, store and handle products in such a manner as to protect them from damage.
 - c. Trusses shall be fully braced during and after installation as recommended by TPI HIB-91.
 - d. Trusses cut or damaged during erection or subsequent construction shall be replaced or repaired.
 - e. Repair diagrams shall be certified by the designer and submitted to the Architect.

END OF SECTION

06 20 00 - FINISH CARPENTRY

- A. GENERAL
 - 1. SCOPE
 - a. Provide all labor, materials and equipment necessary and required to complete all finish carpentry work as shown on the drawings and specified herein.
 - 1) Closet Rods and Shelving.
 - 2) Hollow Metal Doors/Frames.
 - 3) Wood Doors/Frames.
 - 4) Casework.
 - 5) Acoustical Ceiling Systems.
 - 6) Corner Guards.
 - 7) FRP at Mop Sinks.
 - 8) Miscellaneous Wood Trim.
 - 9) Door Finish Hardware.
 - 10) Window Shades.
 - 11) Toilet Room/Bath Room Accessories, Miscellaneous Accessories.
 - 12) Interior Signage.
 - 13) Solid Surface Window Stools.
 - 14) Metal Stair Handrails.
 - 15) Fire Extinguisher Cabinets.
 - 16) Postal Mailbox Cabinets.
 - 17) Joint Sealants, Miscellaneous Fire Stopping.
 - 2. RELATED WORK SPECIFIED ELSEWHERE
 - a. Section 06 10 00 ROUGH CARPENTRY
 - b. Section 07 92 00 JOINT SEALANTS
 - c. Section 08 11 13 HOLLOW METAL DOORS AND FRAMES
 - d. Section 08 14 00 WOOD DOORS
 - e. Section 08 31 00 ACCESS DOORS AND PANELS
 - f. Section 08 71 00 DOOR HARDWARE
 - g. Section 09 51 00 ACOUSTICAL CEILINGS.
 - h. Section <u>10 26 13 CORNER GUARDS</u>
 - i. Section 10 44 16 FIRE EXTINGUISHERS AND CABINETS
 - j. Section <u>10 55 00 POSTAL SPECIALTIES</u>
 - k. Section <u>12 24 00 WINDOW SHADES</u>
 - I. Section <u>12 35 30 CASEWORK</u>
 - 3. QUALITY ASSURANCE

- a. <u>Contractor:</u>
 - 1) All carpenters performing Finish Carpentry work shall be skilled in this trade and completely familiar with the materials and methods called for herein.

4. QUALITY STANDARDS

a. Except as otherwise shown or specified, comply with requirements of Architectural Woodwork Institute (AWI) "Quality Standards" for Premium Grade.

5. CODES

a. All work specified in this Section shall be in accordance with Local and State Building Codes and specified provisions of other regulatory agencies.

6. SUBMITTALS

- a. <u>Shop Drawings</u>:
 - 1) Submit shop drawings of items specified herein, and manufacturer's descriptive literature of specialty items.

7. INSTALLATION

- a. <u>General</u>:
 - 1) Inspect all surfaces and structure to receive materials and verify that no defects or errors are present which would result in poor application or latent defects in workmanship.
 - 2) Verify all dimensions of in place construction to ensure the proper installation of all materials specified.
 - 3) Install the work plumb, level, true and straight with no distortions.
 - 4) Shim as required using concealed shims.
 - 5) Install to a tolerance of 1/8" in 8' for plumb and level countertops; and with 1/16" maximum offset in flush adjoining surfaces, and 1/8" maximum offsets in revealed adjoining surfaces.
 - 6) Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
 - 7) Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates.
 - 8) Secure to grounds, stripping and blocking with countersunk, concealed fastener and blind nailing as required for a complete installation.
 - 9) Use fine finishing nail for exposed nailings, countersunk and filled flush with finished surface and matching final finish where transparent is indicated.
- b. <u>Casework</u>:
 - 1) Install without distortion so that doors and drawers will fit openings properly and be accurately aligned.
 - 2) Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 - 3) Complete the installation of hardware and accessory items as indicated.
- c. <u>Countertops</u>:
 - 1) Anchor securely to base unit and other support systems as indicated.
 - 2) Scribe and route to fit all adjacent wall surfaces.

8. ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

- a. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork.
- b. Adjust joinery for uniform appearance.
- c. Clean finish carpentry work on exposed and semi-exposed surfaces.
- d. Touch-up shop-applied finishes to restore damaged or soiled areas.
- e. Clean hardware, lubricate and make final adjustments for proper operation.
- f. <u>Protection</u>: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

9. INSTALLATION OF HOLLOW METAL FRAMES

- a. Install hollow metal frames and associated hardware shall be in accordance with the recommendations of the Steel Door Institute, SDI 100.
- b. Install hollow metal frames in partitions.
 - 1) Proceed in accordance with the frame instructions.
 - 2) Before securing a frame, make jambs plumb and head level.
 - 3) Place door in opening and adjust frame for proper clearances being careful not to damage door.
 - 4) Install labeled frames to meet U.L. requirements.

10. INSTALLATION OF HOLLOW METAL DOORS

- a. Install hollow metal doors and associated hardware shall be in accordance with the recommendations of the Steel Door Institute, SDI 100.
 - 1) Inspect door and frame prior to installation to confirm labels are affixed where fire rating is required.
- b. Comply with manufacturer's instructions for the installation of hollow metal doors.
- c. Drill and tap for machine screws.
 - 1) Do not use self-tapping sheet metal screws except as otherwise shown or specified.
- d. Hang doors with hardware as scheduled and approved.
- e. Adjust door installations to provide uniform clearances at heads and jambs, and to contact stops uniformly.
- f. Provide clearances at jambs and heads not to exceed 3/8", except where indicated to be undercut or to clear thresholds.
- 11. INSTALLATION OF WOOD DOORS

- a. Installation of wood doors and associated hardware shall be in accordance with the recommendations of the National Woodwork Manufacturer's Association.
 - 1) Inspect door and frame prior to installation to confirm labels are affixed where fire rating is required.
- b. Allow doors to become acclimated to site heat and humidity before handling.
- c. In fitting for width, trim equally from both sides.
 - 1) Fire rated doors shall be trimmed no more than 3/16".
 - 2) Clearances at jambs shall not exceed 1/8".
- d. In fitting for height do not trim top or bottom rails more than 3/4".
- e. Fire rated doors shall be trimmed only from the bottom rails and shall be trimmed no more than 1".
- f. Clearance at head shall not exceed 1/8" and 3/8" at bottom except where indicated to be undercut.
- g. Use threaded to the head wood screws for fastening hardware.
 - 1) Pilot holes shall be drilled for all screws.
- h. Provide through bolts on all half-surface hinges and closers for all fire rated doors.
- i. Cut doors for hardware.
- j. Final adjustments for proper operation of doors shall be made prior to acceptance by Owner.
- k. Do not remove Underwriter Laboratories Labels from fire doors for any reason.

12. INSTALLATION OF FINISH HARDWARE

- a. Examine all doors, frames and hardware for damage, defects and suitability for intended use.
- b. Restore all parts or items found damaged, defective or inadequate or replace with good material before installation.
- c. Apply finish hardware as recommended by the manufacturer.
- d. Fit lock and latch sets to their respective doors.
- e. On doors which will be finished and then reinstall the hardware.
- 13. MOUNTING HEIGHTS
 - a. Heights given are center line heights up from finish floor unless stated otherwise; heights given "Number to Number" indicate that all shall be at one height within limits given. Where heights of items are not listed, mount in accord with recommendations of DHI.
 - 1) Bottom hinge 10" to 13".
 - 2) Top hinge 6" to 8" down from head.

- 3) Intermediate hinge equally spaced.
- 4) Door lever 36" to 40-5/16".
- 5) Deadlocks 54" to 60".
- 6) Door pull & push bars 42" to 45".

14. FITTING

- a. Fit all hardware accurately and properly.
- b. Remove exposed parts until after painter's finish is completed, then reinstall.
- c. Securely fasten all fixed parts.
- d. Fit faces or mortised parts snug and flush.
- e. Make sure operating parts move freely and smoothly without binding, sticking or excessive clearance.

15. ADJUSTING AND FINISHING

- a. After work has been otherwise completed, examine all hardware for complete and proper installation.
- b. Lubricate bearing surfaces of moving parts.
- c. Adjust latching and holding devices to proper function.
- d. Adjust door control to approved keying system.
- e. Clean all exposed surfaces, examine for surface damage and polish.

16. THRESHOLDS

- a. Install door bottoms in continuous piece, full width of opening.
- b. Set in full bed of mastic and fasten with countersunk anchors at 6" on centers.

17. WEATHERSTRIPPING

a. Install so that weatherstripping provides an effective seal against water and weather.

18. INSTALLATION OF TOILET ACCESSORIES

- a. Install toilet accessory units in accordance with manufacturer's instructions, using concealed fasteners which are appropriate to substrate and recommended by manufacturer of unit.
- b. Install units plumb and level, firmly anchored in locations indicated.
- c. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.

d. Clean and polish all exposed surfaces after removing protective coatings.

19. INSTALLATION OF SIGNS

- a. Install exterior and/or interior sign units where shown or directed, using mounting methods of type indicated and in compliance with manufacturer's instructions.
- b. Install sign units level, plumb and at height indicated, with sign surfaces free from distortion or other defects of appearance.
- c. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions.
- d. Protect units from damage until acceptance by Owner.

END OF SECTION

06 40 23 ARCHITECTURAL WOODWORK

- A. SCOPE
 - 1. GENERAL
 - a. Provide labor, materials, and equipment necessary for the complete installation of custom millwork as indicated. Items to be provided, but not limited to, are as follows:
 - 2. APPLICABLE WORK
 - a. Plastic Laminate Countertops.
 - b. Solid Surface Countertops.
 - c. Solid Surface Windowsill and Apron.
 - d. Custom Fabricated Reception Desk.
 - 3. RELATED DOCUMENTS
 - a. The provisions of the Section <u>00 72 00 GENERAL CONDITIONS;</u> Section <u>00 73</u> <u>00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1</u> <u>GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein.
 - 4. RELATED WORK SPECIFIED ELSEWHERE
 - a. Section 06 20 23 FINISH CARPENTRY.
 - b. Section <u>09 91 00 PAINTING</u>.
 - c. Section <u>12 35 30 CASEWORK</u>.
 - 5. ACCESIBILITY REQUIREMENTS
 - a. Millwork shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations.
 - 1) These requirements supersede Technical Specifications in this section.

6. SUBMITTALS

- a. Product data for each type of product and process specified in this section and incorporated into items of custom millwork during fabrication, finishing, and installation.
- b. <u>Shop Drawings</u>: Provide shop drawings for vanity countertop support brackets verifying knee and toe clearances as indicated in the Drawings.
 - 1) Shop drawings shall indicate dimensions, components, mounting requirements, and fasteners.
- c. <u>Samples for verification purposes of the following:</u>

- 1) Lumber with or for transparent finish, 50 sq. in., for each species and cut, finished on one side and one edge.
- 2) Wood veneer faced panel products; with or for transparent finish, 8-1/2" by 11", for each species and cut.
- d. Available color and pattern choices for plastic laminate surfacing (one complete chain).
- e. <u>Solid Surface Test and Evaluative Reports</u>:
 - 1) Submit flammability test reports (and food preparation zone certifications/listing confirming compliance with NSF/ANSI 51. Refer to <u>www.nsf.org</u> for the latest compliance to NSF/ANSI 51 for Food Zone all food types.
- 7. QUALITY ASSURANCE
 - a. Manufacturer or woodworking company shall be an active member of the Architectural Woodwork Institute and shall comply with the latest AWI Quality Standards for construction.
- 8. DELIVERY, STORAGE AND HANDLING
 - a. Protect millwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
 - b. Do not deliver millwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas.
 - If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in Project Conditions.
- 9. PROJECT CONDITIONS
 - a. The millwork manufacturer or woodworking company shall be responsible for quantities shown on Drawings.
 - b. <u>Environmental Conditions</u>:
 - Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation.
 - 2) Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0% of optimum moisture content from date of installation through remainder of construction period.
 - c. <u>Field Measurements</u>:
 - 1) Where millwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing
 - 2) Show recorded measurements on final shop drawings.
 - 3) Coordinate manufacturing schedule with construction progress to avoid delay of work.

10. COORDINATION

a. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other sections to ensure that interior architectural woodwork can be supported and installed as indicated.

11. WARRANTY

- a. The millwork manufacturer or woodworking company shall warrant the products from delamination, loose edges, defective or broken hardware, loose trim, and horizontal or vertical members coming apart from each other for three (3) years after date of Substantial Completion.
- b. If problems occur, each affected item shall be repaired in the field or replaced at no cost to the Owner.

B. PRODUCTS

- 1. MATERIALS
 - a. <u>General</u>: Provide materials that comply with requirements of the AWI woodworking standard for each type of millwork and quality grade indicated and, where the following products are part of millwork, with requirements of the referenced product standards, that apply to product characteristics indicated:
 - 1) <u>Hardboard</u>: ANS/AHA A135.4.
 - 2) <u>High Pressure Laminate</u>: NEMA LD 3.
 - 3) <u>Medium Density Fiberboard</u>: ANSI A208.2.
 - 4) Particleboard: ANSI A208.1
 - 5) <u>Hardwood Plywood & Face Veneers</u>: HFVA HP-1.
 - 6) <u>Softwood Plywood</u>: PS 1.
 - 7) <u>Formaldehyde Emission Levels</u>: Comply with formaldehyde emission requirements of each voluntary standard referenced below:
 - a) <u>Hardwood Plywood</u>: NPMA FE.
 - b) <u>Medium Density Fiberboard</u>: NPA9.
 - c) <u>Particleboard</u>: NPA8
 - 8) Composite Woods with exposed particle board shall not contain added urea-formaldehyde.
 - 9) Colors/patterns shall be selected by the Architect from among the full complement of choices of each component.
 - a) Palette of limited available choices for casework colors are <u>not</u> acceptable.
 - b. <u>Plywood, Hardwoods</u>:
 - 1) <u>Substrate</u>: 3/4" thick, APA, B-D Grade, Group 2, Exposure 1, plywood.
 - 2) <u>Face Veneer</u>: 1/2" thick, Group 1, plywood.
 - 3) <u>Transparent Finish</u>: Shall be stain grade birch veneer on exposed edges.
 - 4) <u>Opaque Finish</u>: Shall be paint grade poplar on exposed edges.
 - a) Paint grade MDF will be an acceptable alternate material for painted materials.
- 2. HARDWARE
 - a. <u>Grommets</u>:

- 1) High impact ABS cable hole cover, 2-1/2" inside diameter, with spring closure in top.
- 2) Color as selected by Architect. Refer to Drawings for locations.
- 3) <u>Manufactured by</u>:
 - a) Mockett
 - b) Hafele.
- b. <u>Countertop Support Brackets</u>: Shall be 6063-T6 extruded aluminum brackets as manufactured by RAKKS. All brackets are to be factory primed for field painting.
 - 1) <u>25" Deep Countertops</u>: Model EH-1818.
 - 2) <u>30" Deep Countertops</u>: Model EH-1824.
 - 3) Provide "FM" Flush Mount option for all brackets to be fastened to wall studs.
 - 4) <u>Vanity Supports</u>: Model EHV

3. CUSTOM CASEWORK

- a. <u>Quality Standard</u>: Comply with AWI Section 400 and its Division 400A "Wood Cabinets".
 - 1) <u>Grade</u>: Premium.
- b. <u>Wood Species for Exposed Surfaces</u>: Maple, rift sawn/cut, unless noted otherwise.
 - 1) <u>Grain Matching</u>: Run and match grain vertically for fixed panels.
 - 2) <u>Matching of Veneer Leaves</u>: Slip matching.
 - 3) <u>Veneer Matching Within Panel Face</u>: Running match.
- c. <u>Wood Species for Semi-Exposed Surfaces</u>: Match species and cut indicated for exposed surfaces.
- 4. FACTORY FINISHING OF CUSTOM MILLWORK
 - a. <u>Quality Standard</u>: Comply with AWI Section 1500 unless otherwise indicated.
 - b. <u>General</u>: The entire finish of "Custom Millwork" is specified in this section, regardless of whether factory applied or applied after installation.
 - 1) <u>Factory Finishing</u>: To the greatest extent possible, finish custom millwork to

receive transparent finish at factory.

- a) Defer only final touch-up, cleaning, and polishing until after installation.
- 2) <u>Field Finish</u>: All custom millwork to receive painted finish shall be factory primed and finish painted after installation.
- 3) <u>Preparation for Finishing</u>: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces and similar preparations for finishing of woodwork.
- 4) <u>Transparent Finish</u>: Comply with requirements indicated below for grade, finish system, staining, effect, and sheen.
 - a) <u>Grade</u>: Premium.
 - b) <u>AW I Finish System</u>: Conversion Varnish.
 - c) <u>Staining</u>: Match approved sample for color.
 - d) <u>Effect</u>: Closed grain (filled finish).

e) <u>Sheen</u>: Semi-gloss bright rubbed effect 55-60°.

5. FABRICATION, GENERAL

- a. Fabricate millwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1) Edges of solid wood (lumber) members less than 1" in nominal thickness: 1/16".
 - Edges of rails and similar members more than 1" in nominal thickness: 1/8".
- b. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items.
 - 1) Locate openings accurately and use templates or rough-in diagrams to produce accurately sized and shaped openings.
 - 2) Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutout with a water-resistant coating.

6. PLASTIC LAMINATE COUNTERTOPS

- a. <u>Plastic Laminate Backing</u>: Shall be Industrial Grade Medium Density Particleboard, 3/4" thick. Provide phenolic backer sheets
 - 1) At tops with sink cutouts, backer shall be noted as above and have a 24-hour swell factor \leq 5% and 24-hour water absorption factor \leq 10%.
- b. <u>Phenolic Backer Sheets</u>: Shall comply with the following:
 - 1) <u>Product:</u> Wilsonart Phenolic Backer Sheets.
 - a. <u>Sheet Thickness</u>: 0.25 nominal.
 - b. <u>Laminate Conformance Standard</u>: NEMA LD3
 - c. <u>Color, Pattern and Finish</u>: Selected from manufacturer's full range if available selections.
 - 2) <u>Fire-Rated Backer Sheet</u>: Shall comply with the following:
 - a. Wilsonart Type 266-FR.
 - b. Use in conjunction with Wilsonart Type 605 Fire-Rated Laminate.
 - c. Class A rated according to NFPA 101.
- c. <u>Decorative Laminate</u>:
 - 1) <u>Manufacturer</u>:
 - a) <u>Basis of Design</u>: Wilsonart
 - 2) <u>Acceptable products manufactured by:</u>
 - a) Formica Corporation.
 - b) Nevamar Corporation.
 - c) Architect approved equal which meets or exceeds the requirements of this section may be submitted.
 - 3) Color selected by the Architect.
 - 4) <u>Laminate Properties</u>:
 - a) <u>Laminate Composition</u>: Decorative surface papers impregnated with melamine resins and pressed over kraft paper core sheets impregnated with phenolic resin.
 - b) <u>Surface Burning Characteristics</u>:
 - (i) <u>Test Standards</u>: ASTM E84, ASTM E162, ASTM E662, IMO FTP Code Part 2 and Part 5, and UL 723.

- (ii) <u>Interior Finish Classification, Fire-Rated Laminate</u>: Class A according to NFPA 101. Flame spread less than 25 and Smoke Developed less than 450.
- 5) Decorative Laminate Products:
 - a) <u>Wilsonart Vertical Surface Laminate Product</u>: Type 335.
 - (i) <u>Sheet Thickness</u>: 0.028" nominal.
 - (ii) <u>Laminate Conformance Standard</u>: NEMA LD 3, Grades VGS and VGP.
 - b) <u>Wilsonart HD High-Definition Laminate</u>: Type 376.
 - (i) <u>Sheet Thickness</u>: 0.039" nominal.
 - (ii) <u>Laminate Conformance Standard</u>: NEMA LD 3, Grade HGP.
 - Wilsonart Fire-Rated Decorative Laminates: Type 605.
 - Manufactured with a fire-retardant-treated kraft phenolic core.
 - a) Sheet Thickness: 0.048" nominal.
 - b) Laminate Conformance Standard: NEMA LD 3, Grade HGF.
- 7) <u>Accessory Materials</u>:

C)

6)

- a) <u>Contact Adhesive</u>:
 - (i) <u>Product</u>: Wilsonart 1730/1731 Low VOC Contact Adhesive.
 - (ii) <u>Description</u>: High solids, low VOC contact adhesive for non-post-forming applications.
- b) <u>Contact Adhesive, Water-Based</u>:
 - (i) <u>Product</u>: Wilsonart H20.
 - (ii) <u>Description</u>: Non-flammable low VOC water-based contact adhesive for post-forming applications.
- 8) <u>Fabrication</u>:
 - a) Laminate Cladding for Horizontal Surface:
 - (i) <u>Grain Direction</u>: Parallel to longest dimension.
 - (ii) <u>Edge Treatment</u>: Same as laminate cladding on horizontal surfaces, unless noted otherwise.
 - (aa) <u>Typical Dwelling Units</u>: Provide post form countertop with waterfall edge and 4" backsplash.
 - (bb) <u>Handicapped-Accessible Dwelling Units and</u> <u>Common Areas</u>: Where laminate countertops are identified, provide post form waterfall edge at countertop.
 - (i) Provide 6" self-edge backsplash.
 - (ii) Round outside corners with 2" radii.
- d. Countertops, backsplashes and drop edges shall be of high-pressure decorative plastic laminate fully adhered to backing.
 - 1) There shall be no seams or joints in the plastic laminate across the countertops, backsplashes or drop edges unless locations are approved by Architect.
 - 2) Install moisture sealing phenolic backer sheets under all countertop construction.
 - 3) The perimeter of all countertops and cut-outs shall be sealed with a one-part silicone sealant.
 - 4) Refer to Section <u>07 92 00 JOINT SEALANTS</u>.
 - 5) All plastic laminates shall be secured to backing in strict accordance with the written instructions of the manufacturer.

- 7. SOLID SURFACE
 - a. <u>Manufacturers</u>:
 - 1) <u>Basis of Design</u>:
 - a) This Specification is based on Wilsonart products, unless noted otherwise.
 - b) Comparable products from manufacturers listed herein will be accepted provided they meet requirements of this Specification.c) Color to be selected by Architect.
 - 2) <u>Manufacturer List</u>: Products of the following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules, and Specifications:
 - a) Corian by DuPont.
 - b) Samsung Chemical USA.
 - c) Meganite.
 - 3) <u>Reference Standards:</u>
 - a) ASTM D785-08 Standard Test for Rockwell Hardness of Plastics and Electrical Insulating Materials.
 - b) ASTM D790-10 Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - c) ASTM 5420-10 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
 - d) ASTM E81-10 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - e) ASTM G21-13 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
 - f) ASTM G22-76(96) Standard Practice for Determining Resistance of Plastics to Bacteria.
 - g) CSA B45.5-11/1APMO Z124-2011– Plastic Plumbing Fixtures.
 - h) NFPA 255-06 Standard Method of Test of Surface Burning Characteristics of Building Materials.
 - i) NSF/ANSI 51-07 Food Equipment Materials.
 - j) SCAQMD Rule 1168 Adhesive and Sealant Applications (amended January 2005).
 - k) UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.
 - b. <u>Materials</u>:

1) <u>Solid Surface Material</u>:

- a) Shall be non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.
- b) <u>Flammability</u>: Class 1 and A when tested to UL 723.
- 2) <u>Adhesive for Bonding to Other Products</u>: One component silicone to ASTM C920.
- 3) <u>Sealant</u>: A standard mildew-resistant, FDA/UL recognized silicone color matched sealant or clear silicone sealants.
- 4) <u>Sink/Bowl Mounting Hardware</u>: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of undermount sinks/bowls.
- 5) <u>Windowsills</u>: 1/2" thick solid surfacing material, adhesively joined with inconspicuous seams, edge details as indicated on Drawings.

- a) Color selected by Architect from manufacturer's full color range.
- 6) <u>Countertops</u>: 1/2" thick countertop of solid surfacing material, cast to desired profiles and sizes having 1-1/2" edge details as selected by the Architect conforming to CSA B45.5/IAPMO Z124.
 - a) Provide countertops complete with backsplashes of size shown on Drawings.
 - b) Use undermount hardware according to manufacturer's instructions.
 - c) Color to be selected by Architect from manufacturer's full range.
- 7) <u>Fabrication</u>:
 - a) Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
 - b) Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - c) Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
 - d) Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining.
 - e) Cut components larger than finished dimensions and sand edges to remove nicks and scratches.
 - f) Heat entire component uniformly prior to forming.
 - g) Ensure no blistering, whitening, qand cracking of components during forming.
 - h) Fabricate backsplashes from solid surface material with radius cove where counter and backsplashes meet as indicated on Drawings.
 - i) Fabricate joints between components using manufacturer's standard joint adhesive.
 - (i) Ensure joints are inconspicuous in appearance and without voids.
 - (ii) Attach 50mm (2") wide reinforcing strip of polymer material is not required when using Dupont[™] Joint Adhesive 2.0.
 - j) Provide holes and cutouts for plumbing and bath accessories as indicated on Drawings.
 - k) Rout and finish component edges to smooth, uniform finish.
 - (i) Rout cutouts, then sand edges smooth.
 - (ii) Repair or reject defective or inaccurate work.
 - <u>Color Finish</u>: Ensure surfaces have uniform matte finish with 60° gloss rating of 5-20.
 - (i) Color shall be selected from manufacture's full range of colors.
 - m) <u>Edge Treatment</u>: Shall be selected by Architect from manufacture's full range.

C. EXECUTION

- 1. INSTALLATION, GENERAL
 - a. <u>Quality Standard</u>: Install millwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type involved.

- b. Install woodwork plumb, level, true, and straight with no distortions.
 - 1) Shim as required with concealed shims. Install to a tolerance of 1/8" in 96" for plumb and level (including tops).
 - 2) The installer shall make use of filler sections, if required, and scribe panels to fit casework and furniture to specific dimensions.
 - Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation.
 - 4) Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
 - 5) <u>Countertops</u>:
 - a) Anchor securely to base units and other support systems as indicated.
 - b) Caulk space between backsplash and wall with specified sealant.
 - c) Install countertops with no more than 1/8" in 96" sag, bow, or other variation from a straight line.
 - d) Back and side splashes on solid surfacing countertops shall be adhered to countertops using manufacturer's standard color-matched silicone sealant.
 - 6) Complete the finishing work specified in this section to the extent not completed at shop or before installation of woodwork.
 - 7) Fill nail holes with matching filler where exposed.
 - a) Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in the shop.
- c. <u>Adjustment</u>: Defective workmanship or damaged components shall be corrected; repaired, or replaced, as requested by Architect without further cost to the Owner.

END OF SECTION

07 21 00 - THERMAL BUILDING INSULATION

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIRMENTS</u> apply to this Section.
 - b. <u>Composite Insulating Wall Sheathing</u>: Refer to Section <u>06 10 00 ROUGH</u> <u>CARPENTRY.</u>
 - c. Acoustical insulation in interior metal stud walls: Refer to Section <u>09 21 16</u> <u>GYPSUM DRYWALL ASSEMBLIES</u>
 - d. Insulation of mechanical items: Refer to Division <u>23 HVAC AIR DISTRIBUTION</u>

2. SUMMARY

- a. <u>Section Includes:</u>
 - 1) Rigid Insulation
 - 2) Foam Insulation/Sealant
 - 3) Loose Fill Fiberglass Insulation
 - 4) Thermal Batt Insulation
- 3. SUBMITTALS
 - a. Comply with Section <u>01 33 01 SUBMITTALS</u>
 - b. <u>Product Data</u>: Manufacturer's specifications and technical data for each type of insulation product specified. Data shall include the following:
 - 1) Detailed specification of construction and fabrication.
 - 2) Manufacturer's installation instructions.
 - 3) Certified test reports clearly indicating compliance with 'R' requirements at 75° F.
- 4. QUALITY ASSURANCE
 - a. <u>Single-Source Responsibility</u>: Obtain each type of building insulation from a single source with resources to provide products complying with indicated requirements without delaying the Work.
 - b. <u>Manufacturer's Qualifications</u>: Not less than five (5) years experience in the actual production of specified products.
 - c. <u>Installer's Qualifications</u>: Firm experienced in installation of systems similar in complexity to those required for this Project.
 - d. <u>Regulatory Requirements</u>:
 - 1) <u>Foam Plastic Insulation</u>: Flame spread rating of not more than 75 and a smoke density of not more than 450.

2) <u>Blanket Type Insulation</u>: Flame spread rating of not more than 25 and a smoke density of not more than 450.

5. DELIVERY, STORAGE AND HANDLING

- a. <u>Packing and Shipping</u>: Deliver products in original unopened packaging with legible manufacturer's identification.
- b. <u>Storage and Protection</u>:
 - 1) Store materials in area protected from weather, moisture, direct Sunlight, and open flame or sparks.
 - 2) Comply with manufacturer's recommendations and as follows:
 - a) Store products in a cool, dry location out of direct sunlight.
 - b) Protect from damage caused by the elements and from construction procedures.
 - c) Store at a temperature of not less than 40° F.

B. PRODUCTS

- 1. RIGID INSULATION
 - a. Vertical application for rigid installation at exterior building foundation walls. Consult drawings for locations, thickness', etc.
 - 1) Extruded polystyrene insulation conforming to the following:
 - a) ASTM C578, Type IV.
 - b) <u>Thickness</u>: As indicated.
 - c) <u>Density:</u> Not less than 1.6 pounds per cubic foot.
 - d) <u>Compressive Strength</u>: Not less than 25 psi.
 - e) Aged 'R' value at 75° F. per 1" thickness.- not less than 5.0
 - f) Acceptable Manufacturers and Product:
 - (i) <u>Dow Chemical</u>: Styrofoam.
 - (ii) U.C. Industries: Foamular 250.
 - (iii) <u>DiversiFoam Products</u>: Certifoam.
 - (iv) <u>Amoco Foam Products Company:</u> Amofoam CM.
 - b. Horizontal application for installation on or below concrete slabs. Consult drawings for locations, thickness', etc.
 - 1) High Density, Extruded polystyrene insulation with standard square edges and smooth surfaces conforming as follows.
 - a) ASTM C578, Type VI.
 - b) <u>Compressive Strength</u>: Not less than 40 psi.
 - c) <u>Thickness</u>: As indicated.
 - d) Acceptable Manufacturers and Product:
 - (i) DiversiFoam Products: Certifoam 40
 - (iii) <u>Dow Chemical</u>: Styrofoam.
 - (iv) U.C. Industries: Foamular.

2. FOAM INSULATION - SEALANT

- a. <u>Polymeric Foam Insulation/Sealant</u>: Closed cell expanding polyurethane foam insulation
 - 1) <u>Acceptable Manufacturers and Product</u>:
 - a) W.R. Grace & Co., Construction Products Division: Polycel One.
 - b) Comparable Architect approved manufacturers
3. LOOSE-FILL FIBERGLASS INSULATION

1)

a. <u>Fiberglass Expanding Blown-in Insulation</u>:

- Acceptable manufacturers and product:
 - a) AttiCat Pink Fiberglas Insulation.
 - b) Comparable Architect approved manufacturers
- b. Insulation shall comply with the following:
 - 1) Insulation shall be manufactured in accordance with ASTM C764 Type I (pneumatic application).
 - 2) R-values shall be determined in accordance with ASTM C687.
 - 3) Loose-fill insulation shall be deemed non-combustible when tested in accordance with ASTM E136.
 - 4) The surface burning characteristics of this product have been determined in accordance with: ULC S 102.2 ASTM E 84*
 - a) Flame Spread: 0
 - b) <u>Smoke Developed</u>: 0
- c. <u>R-Value</u>: R45 in Roof/Ceiling Assembly
- 4. THERMAL BATT INSULATION
 - a. <u>Thermal Batt Insulation</u>:
 - 1) <u>Acceptable Manufacturers and Product</u>:
 - a) Un-faced Thermal Batt Insulation as manufactured by Owens Corning, or equal approved by the Architect.

5. ACCESSORIES

- a. <u>Adhesive for Fastening Rigid Insulation</u>: As recommended by insulation manufacturer.
- b. <u>Mechanical Fasteners for Fastening Insulation</u>: As recommended by insulation manufacturer.
- c. <u>Joint Tape</u>: Foil faced tape as recommended by insulation manufacturer.

C. EXECUTION

- 1. EXAMINATION
 - a. <u>Verification of Conditions</u>: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
 1) Do not proceed until unsatisfactory conditions have been corrected.
- 2. INSTALLATION
 - a. Comply with manufacturer's recommendations.
- 3. INSTALLATION OF RIGID INSULATION
 - a. Install rigid insulation at locations and of "R" values or thickness not less than those indicated.

- b. Remove any irregularities or jagged surfaces from concrete foundation wall prior to installation.
- c. Carefully cut and fit insulation to provide a tight-fitting assembly.
- d. Butt panels tight together without gaps or voids.
- e. Use a polystyrene compatible adhesive to hold the boards in place during backfilling.
- f. Apply mastic or caulk to the top of the board to prevent water infiltration behind the insulation.

4. INSTALLATION OF LOOSE FILL INSULATION

- a. Do not blend or add additional materials or adhesives to this product during installation.
- b. Follow manufacturer's written instructions for installation of loose fill insulation.
- c. Reference drawings and this specification for required R-Value.

5. INSTALLATION OF BATT INSULATION

- a. Install batt insulation at locations and of thickness or not less than "R" values indicated herein.
- b. Install batt of sufficient size to provide friction fit.
- c. Anchor to studs, gypsum material, and other members using clips and/or other type fasteners to prevent batt from settling.
- d. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within the plane of the insulation.
- e. Leave no gaps or voids.
- 6. MISCELLANEOUS INSTALLATION
 - a. Fill voids and cracks around frames and blocking and other voids in exterior walls with expending foam insulation/sealant.
 - 1) Install expanding foam insulation/sealant in voids less than 1/2" wide. Install full depth of void.

07 26 00 - VAPOR RETARDERS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> apply to this section.
 - b. See Section 03 30 00 CAST-IN-PLACE CONCRETE.
 - 2. SUMMARY
 - a. <u>Products supplied under this section</u>:
 - 1) Vapor barrier and installation accessories for installation under concrete slabs.
 - 3. REFERENCES
 - a. <u>American Society for Testing and Materials (ASTM)</u>:
 - ASTM E1745- 11 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - ASTM E1643- 11 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - b. <u>Technical Reference American Concrete Institute (ACI)</u>:
 - 1) ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 - 2) ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.
 - c. <u>Manufacturer Recommended Repairs</u>:
 - 1) Stego Industries, LLC "Trench Repair" technical memo dated December 2013.
 - 4. SUBMITTALS
 - a. Quality Control/Assurance:
 - 1) Summary of test results per paragraph 9.3 of ASTM E1745.
 - 2) Manufacturer's samples and literature.
 - 3) Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
 - 4) All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
- B. PRODUCTS
 - 1. <u>Materials</u>:
 - a. Vapor barrier shall have all of the following qualities:
 - 1) Maintain permeance of less than 0.01 Perms as tested in accordance

with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).

- 2) <u>Other Performance Criteria</u>:
 - a) <u>Strength</u>: ASTM E1745 Class A.
 - b) <u>Thickness</u>: 15 mils minimum
- 3) Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- b. <u>Vapor Barrier Products</u>:
 - 1) <u>Basis of Design</u>: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 <u>www.stegoindustries.com</u>.
 - 2) Products meeting or exceeding the Specifications may be submitted for consideration by the Architect.

2. ACCESSORIES

- a. <u>Seams</u>:
 - 1) Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
- b. <u>Sealing Penetrations of Vapor Barrier</u>:
 - 1) Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
 - 2) Stego Tape by Stego Industries LLC, (877) 464-7834 <u>www.stegoindustries.com.</u>

c. <u>Perimeter/Edge Seal</u>:

- 1) Stego Crete Claw by Stego Industries LLC, (877) 464-7834 <u>www.stegoindustries.com.</u>
- 2) Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
- StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 <u>www.stegoindustries.com.</u>

d. <u>Penetration Prevention</u>:

1) Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

e. <u>Vapor Barrier-Safe Screed System</u>:

1) Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

C. EXECUTION

- 1. PREPARATION
 - a. Ensure that subsoil is approved by Architect.
 - 1) Level and compact base material.
- 2. INSTALLATION
 - a. Install vapor barrier in accordance ASTM E1643.
 - 1) Unroll vapor barrier with the longest dimension parallel with the direction

of the concrete placement and face laps away from the expected direction of the placement whenever possible.

- 2) Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, or as follows:
 - a) A point acceptable to the Structural Engineer.
 - b) Where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier.
 - c) At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
- 3) Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions.
- 4) Ensure the concrete is clean and dry prior to adhering tape.
- 5) Overlap joints 6" and seal with manufacturer's seam tape.
- 6) Apply seam tape to a clean and dry vapor barrier.
- 7) Seal all penetrations (including pipes) per manufacturer's instructions.
- 8) For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier.
- 9) Use blunt-end and/or threaded nail stakes (screed pad posts) and insert them into Beast Foot.
 - a) Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
- 10) If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
- 11) Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
- 12) Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
- 13) For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

07 31 13 - FIBERGLASS BASED ASPHALT SHINGLES AND ACCESSORIES

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to work of this section.
 - b. Section 06 10 00 ROUGH CARPENTRY
 - c. Section 07 60 00 FLASHING AND SHEET METAL
 - d. Section 07 72 00 ROOF ACCESSORIES, GUTTERS AND DOWNSPOUTS
 - 2. REFERENCES
 - a. ASTM International (ASTM)
 - 1) ASTM A653/A653M -Standard Specification fort Steel Sheet, Zinc Coated (Galvanized) OR Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 2) ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3) ASTM B370 Standard Specification for Copper Sheet and Strip for Building Construction.
 - 4) ASTM D226 Standard Specification for Asphalt -Saturated Organic Felt Used in Roofing and Waterproofing.
 - 5) ASTM D228 Standard Test Method for Sampling, Testing and Analysis of Asphalt Roll Roofing, Cap Sheets and Shingles Used in Roofing and Waterproofing.
 - 6) ASTM D1970– Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Dam Protection.
 - 7) ASTM D3018 Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
 - 8) ASTM D3161 Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
 - 9) ASTM D3462 Standard Specification for Asphalt Shingles Made from Grass Felt and Surfaced with Mineral Granules.
 - 10) ASTM D4869 Standard Specification for Asphalt Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
 - 11) ASTM D6381 Standard Test Method for Measurement of Asphalt Shingle Mechanical Uplift Resistance.
 - 12) ASTM D6757 Standard Specification for Underlayment Felt Containing Inorganic Fibers used in Steep Slope Roofing.
 - 13) ASTM D7158 Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)
 - 14) ASTM E108 Standard Test Method for Fire Test of Roof Coverings.
 - 15) ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
 - b. International Code Council (ICC):

- 1) International Building Code (IBC)
- 2) ICC-ES Evaluation Reports.
- 3) ICC-ES Acceptance Criteria.
- c. Underwriters Laboratories (UL)
 - 1) UL-790 Standard Test Methods for Fire Test of Roof Coverings.
 - 2) UL-997 Wind Resistance of Prepared Roof Covering Materials.
 - 3) UL-2218 Impact Resistance of Prepared Roof Covering Materials.
 - 4) UL-2390 Test Method for Wind Resistant Asphalt Shingles with Sealed Tabs.
- d. Underwriters Laboratories Evaluation Services (UL-ES)
 - 1) UL-ES Evaluation Reports.
- e. Environmental Protection Agency (EPA): ENERGY STAR Rating System.
- 3. SUMMARY
 - a. Roof Shingles and Accessories include the following:
 - 1) Fiberglass Based Asphalt Shingles
 - 2) Hip and Ridge Shingles
 - 3) Starter Shingles
 - 4) Shingle Underlayment
 - 5) Attic Ventilation
 - 6) Fasteners
 - 7) Metal Flashing and Trim
- 4. SUBMITTALS
 - a. Submit in accordance with Section <u>01 33 01 SUBMITTALS</u>.
 - b. <u>Product Data</u>: Manufacturer's data sheets and detail drawings for each product to be used including:
 - 1) Preparation Instructions and Recommendations.
 - 2) Storage and Handling Requirements and Recommendations.
 - 3) Product Literature.
 - 4) Installation Methods.
 - c. <u>Selection Samples</u>:
 - 1) Two (2) complete sets of samples, representing manufacturer's full range of available products and colors.
 - d. <u>Verification Samples</u>: For each product and finish specified submit the following:
 1) Two (2) samples representing actual products and colors.
 - e. <u>Copy of Warranty</u>: For Warranty specified in this section.
- 5. QUALITY ASSURANCE
 - a. <u>Manufacturer Qualifications:</u>
 - 1) Provide all primary roofing products, including shingles, underlayment, leak barrier and ventilation, by a single manufacturer.
 - b. Installer Qualifications:

1) Installer shall follow Owens Corning Roofing and Asphalt published installation instructions.

6. DELIVERY, STORAGE AND HANDLING

- a. Deliver materials to site in Manufacture's unopened bundles with labels intact and legible.
- b. Store all products in Manufacturer's unopened labeled packaging until they are ready for installation.
- c. Handle and store materials on site to prevent damage. Store products in covered, ventilated area at temperature not more than 110° F. Do not store near steam pipes, radiators or in direct sunlight.
- d. Store bundles on flat surface. Do not stack more than two (2) pallets high. If stacking two (2) pallets high, use separator boards to protect the shingles below. Store all rolls on end.
- e. Do not store shingles or underlayment on wet surfaces.
- f. Store and dispose of solvent-based materials in accordance with all Federal, State and Local regulations.
- g. For rooftop loading, lay shingles on wet surfaces. Do not bend over the ridge.
- 7. PROJECT CONDITIONS
 - a. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by the manufacturer for optimum results.
 - b. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.
- 8. WARRANTY
 - a. <u>Manufacturer's Warranty</u>: Provide to the Owner manufacturer's standard prorated warranty coverage for materials in the event of a material defect, including up to twenty (20) years coverage. Refer to actual warranty for complete details, limitations and requirements.

B. PRODUCTS

- 1. MANUFACTURER
 - a. <u>Basis of Design</u>:
 - 1) Owens Corning Roofing and Asphalt LLC. One Owens Corning Pkwy. Toledo, OH 43659. 1-800-ROOFING. Email: <u>ocbuildingsspec@owenscorning.com</u>. Web: <u>www.owenscorning.com</u>.
 - b. Requests for substitutions will be considered in accordance with provisions of Section <u>01 25 13 PRODUCT SUBSTITUTION PROCEDURES</u>.
- 2. ROOF SHINGLES

- a. <u>Duration® Premium (Algae Resistant) Shingles:</u> As manufactured by Owens Corning Roofing and Asphalt, LLC.
 - 1) <u>Nominal Size</u>: 13-1/4" x 39 -3/8"
 - 2) <u>Exposure</u>: 5- 5/8"
 - 3) Shingles Per Square: 64
 - 4) <u>Bundles Per Square</u>: 4 bundles of 16 shingles
 - 5) <u>Coverage Per Square</u>: 98.4 sq. ft.
 - 6) <u>Color</u>: As selected from manufacturer's range.
 - 7) <u>Standards/Qualifications</u>: ASTM D228, ASTM D3018 (Type 1); ASTM D3161 (Class F Wind Resistance), ASTM D7158 (Class A Fire Resistance); ICC-ES AC438, and UL ER2453-01.`
- 3. HIP AND RIDGE SHINGLES
 - a. Provide Hip and Ridge Shingles in color formulated to complement field of roof
- 4. STARTER SHINGLES
 - a. <u>Starter Strip Shingle</u>: As manufactured by Owens Corning Roofing and Asphalt, LLC.
 - 1) Nail applied starter course. Individual starter shingle is 6-5/8" x 39-3/8"
 - 2) Standards/Qualifications: ASTM D3462, ASTMD3161 (Class F Wind Resistance); ASTM E108/UL 790 (Class A Fire Resistance), CSA A123.5, ICC-ES AC438, UL ER2453-01.
- 5. SELF-ADHEREING ICE AND WATER BARRIER
 - a. <u>WeatherLock® Mat</u>: As manufactured by Owens Corning Roofing and Asphalt, LLC
 - 1) Mat-faced skid resistant surface, self-adhering, self-sealing, bituminous ice and water barrier.
 - 2) <u>Roll Width</u>: 36"
 - 3) <u>Selvage</u>: 3"
 - 4) <u>Standards/Qualifications</u>: ASTM D1970, ASTM E108/UL 790 (Class A Fire Resistance); ICC-ESR 1783, CCMC 13403-R.
- 6. SHINGLE UNDERLAYMENT
 - a. Deck Defense® High Performance Roof Underlayment
 - 1) Weather-shedding synthetic polyolefin barrier.
 - 2) <u>Roll Width</u>: 48"
 - 3) Roll Length: 125' and 250'
 - 4) Coverage Per Roll: 5 and 10 Roof Squares.
 - 5) <u>Standards/Qualifications</u>: ASTM E108/UL 790 (Class A Fire Resistance); ICC-ESR 3229; CAN/CSA A220.1 Series 06.
- 7 ATTIC VENTILATION
 - a. VentSure® 4' Strip Heat and Moisture Ridge Vent, 12" width.
 - 1) Shingle-over, polypropylene ridge ventilator designed to work with eave/soffit intake ventilation to maximize the flow of cool, fresh air through the roof and attic structure.
 - 2) Patent-pending corrugated ridge design and interlocking feature for additional flexibility and strength.
 - 3) Provide 20 sq. in. NFVA per lineal foot.

- 4) Optional filter provides added protection against wind driven rain and snow infiltration.
- 5) 4' strip is 15" wide and 1" high, with a shingle-over width of 12"
- 6) Suitable on roofs with pitch from 3:12 to 6:12.
- 7) Standards/Qualifications: ICC-ESR 3007, Passes Wind-Driven Rain with 8-4/5" of rain at 110 mph.

8. FASTENERS

- a. <u>Fasteners</u>: Galvanized steel, stainless steel, or aluminum nails complying with ASTM F1667, minimum 12-guage, 0.0808" diameter head.
- b. All fasteners must be driven flush with the shingle surface and penetrate at least 3/4" thick, the fastener should be long enough to penetrate fully and extend through roof sheathing.
- 9. METAL FLASHING
 - a. Flashing: Provide flashing as specified in Section <u>07 60 00 FLASHING AND</u> <u>SHEET METAL.</u>

C. EXECUTION

- 1. EXAMINATION
 - a. Prior to starting work, examine all roof decks on which work is to be applied for defects in materials and workmanship which may be detrimental to the proper installation or long-term performance of the shingles.
 - b. Underlayment and shingles installed directly over roof insulation or similar type decks is not approved.
 - Roof deck must be dry, minimum 6" wide boards with maximum 1/4" spaces, or APA rated sheathing (exposure 1): minimum 3/8" plywood, minimum 7/16" oriented strand board. Consult manufacturer for other approved constructions.
 - 2) Ventilation under roof deck must meet local requirements.
 - c. Do not begin installation until the roof deck has been properly prepared.
 - d. If substrate penetration is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Commencement of installation constitutes acceptance of conditions.

2. PREPARATION

- a. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- b. Remove all the existing roofing down to roof deck.
- c. Verify installed roof deck is acceptable to receive shingles. Acceptable roof decks include the following:
 - 1) <u>Lumber Sheathing</u>: 6" minimum width, 25/32" minimum thickness.
 - 2) <u>Plywood Sheathing</u>: 3/8" minimum thickness Exposure 1 grade plywood

sheathing as recommended by APA and in compliance with applicable codes.

- 3) <u>OSB Panels</u>: 7/16" minimum thickness non-veneer structural panels as recommended by APA and in compliance with applicable codes.
- 4) Spacing between boards or panels shall not exceed 1/4" between roof boards or between plywood or OSB sheathing panels.
- d. Verify that the deck is dry, structurally sound, clean and smooth. It shall be free of depressions, waves and projections. Cover with minimum 28-gauge; 0.0187" galvanized steel; 0.0156" stainless steel or 0.0126" aluminum sheet metal all holes 1" or less in diameter, cracks over 1/2" in width, loose knots and excessively resinous areas. Decking or deck boards with holes greater than 1" in diameter shall be replaced.
- e. Verify that deck is structurally sound and free of deteriorated decking. All deteriorated and damaged decking shall be removed and replaced with new materials.
- f. Clean deck surfaces thoroughly prior to installation of self-sealing ice and water barrier and underlayment.
- g. Verify that the existing shingles are dry, sound, clean and smooth. All curled, buckled or loose tabs shall be nailed down or removed.

3. UNDERLAYMENT APPLICATION

- a. Install in accordance with manufacturer's instructions.
 - 1) Install using methods recommended by a single manufacturer and in accordance with building codes. When local codes and application instructions are in conflict the local code requirements shall take precedence.
 - 2) Install self-adhering ice and water barrier from the eaves edge of roof up the slope a full 36" but not less than 24" beyond the interior edge of the exterior wall. Lap ends 6" on roof decks sloped 5:12 and greater. On roofs with pitch from 2:12 up to 4:12, see application instructions printed on each package.
- b. Drip Edge:
 - 1) Drip edge to be installed on all roof edges.
 - 2) Install drip edge in eaves first with underlayment installed over the drip edge
 - 3) Install drip edge on rakes after underlayment is installed, with the drip edge fastened over the underlayment.
 - 4) Joints in drip edge shall be lapped minimum 2" with the upslope piece lapped over the slope piece.
 - 5) Install fastener 8" to 10" on center, approximately 1-3/4" from the outside edge if the drip edge.
- c. <u>Valleys</u>:
 - 1) Install self-adhering ice and water barrier at least 36" wide and centered on the valley. Lap ends 6" and seal.
 - 2) Where valleys are indicated to be "open valleys", install metal flashing over self-adhering ice and water barrier before roof deck underlayment is installed; DO NOT nail through flashing. Secure the flashing by nailing at 18" in center just beyond edge of flashing so that nail heads

hold down the edge or use valley metal with a formed edge and secure with clips.

- d. <u>Roof Deck</u>:
 - On roofs with a pitch greater than 4:12, lap horizontal edges at least 2" over self-adhering ice and water barrier. Lap ends at least 4". End laps in succeeding course should be located at least 6' from end laps in preceding course.
 - 2) On roofs with pitch between 2:12 to less than 4:12, see application instructions printed on each shingle wrapper, or follow local code requirements.
 - 3) Lap underlayment over valley protection at least 6".
- e. <u>Penetrations</u>:
 - 1) <u>Vent Pipes</u>: Install a 24" square piece of self-adhering ice and water barrier lapping over roof deck underlayment; seal tightly to pipe.
 - 2) <u>Vertical Walls</u>: Install self-adhering ice and water barrier extending at least 3"-4" up the wall and 12" on to the roof surface. Lap the membrane over the roof deck underlayment.
 - 3) <u>Chimneys</u>: Install self-adhering ice and water barrier around entire chimney extending at least 6" up the wall and 12" on to the roof surface. Lap the membrane over the roof deck underlayment.
- 4. SHINGLE INSTALLATION
 - a. Install shingles in accordance with manufacturer's printed installation instructions.
 - b. Install starter course at lowest roof edge and along rake with edge of shingles extending 1/4" over edge of roof.
 - c. Install first and successive courses of shingles stepping diagonally up and across roof deck with manufacturer's recommended offset at each succeeding course. Maintain uniform exposure of shingles at each succeeding course.
 - d. Fasten shingles to deck with manufacturer's recommended number of roofing nails per shingle, or in accordance with local codes.
 - e. Install ridge vents and shingles at valleys, hips and ridges in accordance with manufacturer's recommendations and local code requirements.
- 5. PROTECTION
 - a. Protect installed products until completion of project.
 - b. Touch-up, repair or replace damaged products before Substantial Completion.

07 46 40 VINYL AND POLYMER SIDING AND ENGINEERED WOOD TRIM

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of the Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00</u> <u>73 00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1 GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein.
 - b. Section <u>06 10 00 ROUGH CARPENTRY</u>.
 - c. Section <u>07 92 00 JOINT SEALANTS</u>: For sealants for non-fire resistive rated joint sealants.
 - 2. SECTION INCLUDES
 - a. Vinyl siding, Polymer shake and shingle siding.
 - b. Vinyl soffits.
 - c. Accessories and trim.
 - 3. REFERENCES
 - a. ASTM D7793 Standard Specification for Insulated Vinyl Siding.
 - b. ASTM D3679 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding.
 - c. ASTM D4477 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Soffit.
 - d. ASTM D5206 Standard Windload Resistance Test.
 - e. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - f. ASTM E119 Standard Test Method for Fire Tests of Building Construction and Materials.
 - g. ASTM D7254 Standard Specification for Polypropylene (PP) Siding.

4. DESIGN PERFORMANCE REQUIREMENTS

- a. <u>Regulatory Requirements:</u> Code compliance in accordance with the following:
 1) IBC and IRC
- b. <u>PVC Fire Resistance</u>: Provide vinyl siding products that meet or exceed the following ratings.
 - 1) <u>Flame Spread Index</u>: <25, per ASTM E84.

- 2) <u>Fire Endurance Classification</u>: 1 hour, per ASTM E119 in a wall assembly.
- c. <u>Cedar Impressions Shake and Shingle Siding Fire Resistance</u>: Provide thermoplastic polyolefin siding products that meet or exceed the following ratings:
 <u>Flame Spread Index</u>: <200 per ASTM E84.

5. SUBMITTALS

- a. Submit under provision in Section <u>01 33 01 SUBMITTALS</u>.
- b. <u>Product Data</u>: Manufacturer's data sheets on each product to be used, including:
 - 1) Preparation instructions and recommendations.
 - 2) Storage and handling requirements and recommendations.
 - 3) Installation methods.
- c. <u>Selection Samples</u>: For each finish product specified, (2) two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- d. <u>Verification Samples</u>: For each finish product specified, (2) two samples, minimum size 12" long, representing actual product colors and patterns.

6. QUALITY ASSURANCE

- a. <u>Installer Qualifications</u>: Provide installer with not less than (3) three years of experience with the products specified or has obtained 5-Star Green Contractor (Preferred), 5-Star Contractor (Preferred), or Master Craftsman credentials from CertainTeed.
- b. <u>Mock-Up</u>: Provide a mock-up for evaluation of installation techniques and workmanship.
 - 1) Finish areas designated by Architect.
 - 2) Do not proceed with remaining work until workmanship and color is approved by Architect.
 - 3) Reinstall mock-up area as required to produce acceptable work.

7. DELIVERY, STORAGE AND HANDLING

a. Store products in manufacturer's unopened packaging until ready for installation. Refer to manufacturer's installation instructions for specific storage and handling requirements.

8. PROJECT CONDITIONS

a. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

9. WARRANTY

a. Provide manufacturer's standard lifetime limited warranty on siding products, transferable to new owners.

B. PRODUCTS

1. MANUFACTURERS

- a. Acceptable Manufacturer: CertainTeed Corporation, Siding Products Group, P.O. Box 860, Valley Forge, Pennsylvania 19482. ASD. Tel: (800) 233-8990; Email: ctsiding@certainteed.com; Web: www.certainteed.com.
- b. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 PRODUCT REQUIREMENTS.

2. MATERIALS

- a. <u>Polymer Shakes and Shingle Siding</u>: Provide products made of molded polypropylene as specified in this section and manufactured to comply with requirement of ASTM D 7254
 - 1) Provide elongated nailing slots on nailing flanges to allow movement.
 - 2) Provide products that meet weathering requirements of ASTM D 7254
 - 3) In accordance with ICC ES Acceptance Criteria AC366
 - 4) Provide panel thermometer allowing for proper spacing in various temperatures.
- b. <u>Vinyl Siding, Soffit and Components</u>: Provide products made of extruded polyvinyl chloride as specified in this section and manufactured to comply with requirements of ASTM D 3679.
 - 1) Provide elongated nailing slots on nailing flanges to allow for movement.
 - 2) Factory-notch ends of horizontal panels to form overlapping joints.
 - 3) Provide products that meet weathering requirements of ASTM D 3679.
- c. <u>Cedar Impressions T5 Straight Edge Sawmill Shingles</u>:
 - 1) Design: Triple 5" shingle; sawmill finish.
 - 2) Lock: Certilock Molded Perimeter Lock.
 - 3) Width: 15"
 - 4) Length: 5' plus or minus .025".
 - 5) Average Thickness: 0.100"
 - 6) Panel Projection: 3/4"
 - 7) Panel Exposure: 5" plus or minus .062".
 - 8) Maximum Warp (per 2 panels): 0.250".
 - 9) Panel Thermometer: Monitors panel temperature to help ensure accurate installation.
- d. <u>Monogram D5</u>:
 - 1) <u>Design</u>: Double 5" clapboard; rough cedar finish with STUDfinder Installation System.
 - 2) <u>Nail Hem</u>: RigidForm 220 Technology Roll Over Nail Hem.
 - 3) <u>Lock</u>: CertiLock self-aligning post formed positive lock.
 - 4) <u>Width</u>: 10".
 - 5) <u>Length</u>: 12" plus or minus .025".
 - 6) <u>Average Thickness</u>: 0.046".
 - 7) Panel Projection: 3/4".
 - 8) <u>Panel Exposure</u>: 5" plus or minus .062".
 - 9) <u>Maximum Warp (per 2 panels):</u> 0.250".
 - 10) <u>Color</u>: As selected by Architect from manufacturer's standards.
- e. <u>Single 7" Vertical Board & Batten:</u>
 - 1) Design: Single 7" vertical; rough cedar finish
 - 2) Width: 7".
 - 3) <u>Length</u>: 10'.
 - 4) <u>Average Thickness</u>: 0.052".

- 5) <u>Panel Projection</u>: 1/2".
- 6) <u>Panel Exposure</u>: 7"plus or minus .025".
- 7) <u>Maximum Warp (per 2 panels):</u> 0.250".
- 8) <u>Color</u>: As selected by Architect from manufacturer's standards.
- f. <u>Beaded T2 Soffit, Invisibly Vented</u>:
 - 1) <u>Design</u>: Triple 2" vented; smooth finish.
 - 2) <u>Width</u>: 6" plus or minus .062".
 - 3) <u>Length</u>: 12' 6" plus or minus .025".
 - 4) <u>Average Thickness</u>: 0.039".
 - 5) <u>Exposure</u>: 2" single nailing hem.
 - 6) Maximum Warp (per 2 panels): 0.250".
 - 7) <u>Ventilation</u>: 1.06 sq. inches per sq. ft.
 - 8) <u>Color</u>: As selected by Architect from manufacturer's standards.
- g. <u>Soffit Accessories</u>:
 - 1) J-Channel: 3/8", 1/2", 5/8" and 3/4" by 12' 6" length, for vertical and eave applications.
 - 2) F-Channel: 5/8" and 3/4" by 12' 6" length.
 - 3) Soffit H-Bar: 3/8", 1/2" or 3/4" by 12' 6" length, for horizontal and eave applications.
 - 4) Color: As selected by Architect.
- h. <u>Engineered Wood Trim</u>: Including but not limited to, window casing, frieze boards, fascia boards, belt trim, water table, etc.
 - Exterior Trim: LP Smart Side® 540 Series reversible trim Smooth surface finish; Pre-primed, site-finish paint; See Drawings for sizes and locations. Siding and trim contractor to coordinate trim blocking required for mechanical penetrations through siding including but not limited to dryer vents, furnace vents, electric meter base, electric service entrance and sill cocks. Paint all cut ends prior to installation.
- i. <u>Fasteners</u>:
 - 1) Provide galvanized or other corrosion-resistant nails as recommended by manufacturer of siding products.

C. EXECUTION

- 1. Examination:
 - a. Do not begin installation until substrates have been properly prepared.
 - b. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 2. <u>Preparation</u>:
 - a. Examine, clean, and repair as necessary any substrate conditions which would be detrimental to proper installation.
 - b. Do not begin installation until unacceptable conditions have been corrected.

3. Installation:

- a. Install products in accordance with the latest printed instructions of the manufacturer.
- b. Installer should have current 5-Star Contractor (preferred) or Master Craftsman credentials.
- c. Install products with all components true and plumb.
- d. <u>For Vinyl Siding</u>:
 - 1) Nail horizontal panels by placing nail in center of slot.
 - 2) Nail vertical panels by placing first nail at top of top slot and remaining nails in center of slots.
 - Drive nails straight, leaving 1/16" space between nail head and flange of panel. (NOTE: Refer to CTS205 Installation Manual for latest installation recommendations)
- e. <u>For Polymer Siding</u>. Refer to CTS205 Installation Manual for latest installation recommendations
- f. Allow space between both ends of siding panels and trim for thermal movement. Overlap horizontal panel ends one-half the width of factory pre-cut notches.
- g. Stagger lap joints in horizontal siding in uniform pattern as successive courses of siding are installed.
- h. Install J-channel and flashing to accommodate successive courses of vertical siding. Install wood shims at building corners to bring cut edges of vertical siding out to correct plane.

4. <u>Protection</u>:

- a. Protect installed products until completion of project.
- b. Touch-up, repair or replace damaged products before Substantial Completion.
- 5. <u>Cleaning</u>:
 - a. At completion of work, remove debris caused by siding installation from project site.

07 46 46 - FIBER CEMENT SIDING (ALTERNATE NO. 2)

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to this section.
 - 2. SCOPE
 - a. Provide labor, materials and equipment necessary for complete installation of all fiber cement siding, soffit and accessories. Work of this section includes, but is not limited to:
 - 1) Fiber Cement Board and Batten Siding.
 - 2) Fiber Cement Lap Siding.
 - 3) Fiber Cement Trim and Accessories.
 - 3. SUBMITTALS
 - a. Submit three (3) minimum 12" long samples of each style and texture of fiber cement products specified herein.
 - b. Submit complete product data, including specifications, installation data and other pertinent manufacturer's literature, for each specified product.
 - c. Submit fiber cement cladding manufacturer's prepared shop drawings, including plans, section, and installation details that demonstrate dimensions, edge/termination conditions, compression and control joints, corners, openings and penetrations.
 - 4. PRODUCT HANDLING
 - a. Stack fiber cement siding and engineered wood materials on edge or lay flat on a smooth, level surface.
 - b. Protect edges and corners from chipping.
 - c. Store materials under cover and keep dry prior to installation.
 - 5. WARRANTY
 - a. <u>Material</u>: Fiber cement siding and engineered wood materials shall carry limited product warranty against manufacturing defects for thirty (30) years from date of substantial completion.
- B. PRODUCTS
 - 1. FIBER CEMENT BOARD AND BATTEN SIDING
 - a. Basis of Design:

- 1) Products specified are manufactured by James Hardie Building Products, Inc. unless noted otherwise.
- 2) Items specified are to establish standard of quality for design function, materials and appearance.
- Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional quality of the specified product.
- b. <u>Vertical Siding: Hardie Panel HZ5 Vertical Siding:</u>
 - 1) <u>Profile and Colors</u>: To be selected from manufacturer's standard.
 - 2) <u>Dimensions</u>: Nominal 4' (h) x 10' (l).
 - 3) Panel Thickness: 7/16".
 - 4) <u>Finish</u>: Smooth
- c. <u>Warranty</u>: Manufacturer's standard 50-Year Warranty against manufactured defects in fiber cement panels and 15-Year Warranty against manufactured defects in panel finish.
- d. <u>Fasteners</u>: Corrosion-resistant stainless-steel fasteners.
- 2. BATTENS
 - a. Hardie Trim Smooth Batten Boards.
 - 1) Width: 2 1/2"
- 3. LAP SIDING AND ACCESSORIES
 - a. Basis of Design:

3)

- 1) Product specified is manufactured by <u>James Hardie Building Products</u>. Items specified are to establish standard of quality for design function, materials and appearance.
- 2) Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product.
- b. <u>Clapboard Siding: HardiePlank HZ5 Lap Siding:</u>
 - 1) <u>Profile and Colors</u>: To be selected from manufacturer's standard.
 - 2) <u>Accessory/Components</u>:
 - a) <u>Essential Flashing System</u>: Starter, Compression Joint, Overhang.
 - Dimensions: Nominal 7 1/4" (h) x 12' (l).
 - 4) Panel Thickness: 5/16".
 - 5) Finish: Smooth
 - 6) <u>Exposure</u>: 6".
- c. <u>Trim: 4/4 HardieTrim NT3 Boards Smooth</u>
 - 1) <u>Profile and Colors</u>: To be selected from manufacturer's standard
 - 2) Thickness: 3/4"
 - 3) Width: 3 1/2"
 - 4) Exposure : 3 1/2"
- d. <u>Warranty</u>: Thirty (30) years.

- e. <u>Finish</u>: ColorPlus technology with 15-Year Warranty on finish in color as selected by Architect from manufacturer's standard colors/finishes available.
- f. <u>Fasteners</u>: Corrosion resistant fasteners, per manufacturer's recommendation for intended application/installation.

C. EXECUTION

- 1. FIBER CEMENT BOARD AND BATTEN SIDING
 - a. <u>General</u>:
 - 1) Install products in accordance with the latest installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances.
 - a) Review all manufacturer installation, maintenance instructions, and other applicable documents before installation.
 - b) Consult with your local dealer or James Hardie Technical Department before installing any fiber cement product on a building higher than 45' or three stories.
 - c) Special installation conditions may be required via a technical Review and Special Applications Form process.
 - Vertical control/expansion joints and/or horizontal/compression joints are required.
 - a) Refer to manufacturer's installation guide(s).
 - b) Review manufacturer guidelines for detailed care instructions.

2. FIBER CEMENT LAP SIDING AND TRIM INSTALLATION

a. <u>Preparation</u>:

2)

- 1) Examine wall substrate and verify that sub-wall is plumb and flat to within 1/8" in 10'.
- 2) Correct all deficiencies prior to installation of fiber-cement products.
- b. Installation:
 - 1) Install flashing around all wall openings.
 - 2) Fasten through trim into structural framing or sheathing.
 - 3) Fasteners must penetrate minimum 3/4" or full thickness of sheathing.
 - 4) Additional fasteners may be required to ensure adequate fastening to substrate.
 - a) Follow manufacturer's recommendations regarding drilling pilot holes in trim board at each fastener location prior to installation.
 - 5) Place fasteners no closer than 3/4" and no further than 2" from side edge of trim board and no closer than 1" from end.
 - a) Fasten maximum 16" o.c.
 - 6) Shim frieze board as required.
- c. <u>Finishing</u>: All fiber-cement siding and simulated wood trim materials are to be factory pre-finished.

07 60 00 - FLASHING AND SHEET METAL

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> specification sections apply to this section.
- 2. SUMMARY
 - a. <u>Section Includes</u>:
 - 1) Metal Flashings.
 - 2) Field Fabricating (including bending, cutting, soldering, etc.), of Flashings.
 - 3) Separation of contacting surfaces of dissimilar metals.
 - b. <u>Related Work</u>:
 - 1) <u>Gutter and Downspouts</u>: Refer to other Section <u>07 63 00</u> <u>GUTTERS AND</u> <u>DOWNSPOUTS</u>
 - 2) <u>Joint Sealants</u>: Refer to Section <u>07 92 00 JOINT SEALANTS</u>
- 3. SUBMITTALS
 - a. Comply with Section <u>01 33 01 SUBMITTALS</u> unless otherwise indicated.
 - b. <u>Product Data</u>: Submit manufacturer's specifications and technical data to include:
 - 1) Detailed specification of construction and fabrication.
 - 2) Manufacturer's installation instructions.
 - c. <u>Shop Drawings</u>: Indicate dimensions, description of materials and finishes, general construction, component connections, anchorage methods, and installation procedures, including specific requirements indicated.
 - 1) Layout, profiles, methods of joining, and anchorage details, including major counter-flashings, at convenient scale to accurately review proposed fabrications.
 - d. <u>Contract Closeout Submittals</u>: Comply with Section <u>01 77 00 CLOSEOUT</u> <u>PROCEDURES</u>
- 4. QUALITY ASSURANCE
 - a. <u>Manufacturer's Qualifications:</u> Not less than five (5) years experience in the actual fabrication of specified products.
 - b. Materials, fabrication, and installation shall conform to recommendations/requirements contained in Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" and other recognized industry practices.

5. WARRANTY

- a. Contractor shall warrant that all metal flashing work performed under this section shall be free from defects in materials and workmanship for a period of ten (10) years from date of acceptance.
- b. Contractor agrees to correct all defects in the metal flashing work at no cost to Owner.
- 6. DELIVERY, STORAGE AND HANDLING
 - a. <u>Packing and Shipping</u>: Deliver products in un-damaged condition, suitably identified, for location to be installed.
 - b. <u>Storage and Protection</u>: Comply with fabricator's recommendations.

B. PRODUCTS

- 1. MATERIALS
 - a. <u>Membrane Flashing:</u>
 - 1) Perm-a Barrier Wall Flashing as manufactured by GPC Applied Technologies, or Architect approved equal.
 - a) 40 mil total thickness, self-adhesive cold applied tape consisting of 32 mils of rubberized asphalt integrally bonded to a 8 mil density, cross laminated polyethylene film.
 - b) Primer, sealant, and accessories as recommended by manufacturer.
 - b. <u>Aluminum Flashing</u>:
 - a) Concealed and semi-concealed flashing at all wall-roof intersections; and where indicated on the drawings.
 - b) <u>Pre-finished Aluminum Flashing</u>: Minimum of .032" aluminum formed to the shapes indicated.
 - 1) Use for aluminum cover over facia at gutter locations.
 - 2) Use for wall/sill flashing.
 - 3) <u>Color</u>: Selected by Architect.
 - c) <u>Bituminous Coating</u>: SSPC Paint 12 solvent type bituminous mastic, nominally free of sulfur compounded for 15-mil dry film thickness
 - d) <u>Bituminous Paint</u>: Acid and alkali resistant type black in color. Comply
 - with Fed. Spec. TT-C-494.
 <u>Sealant for Sheet Metal Work</u>: Provided under this Section, but in
 - <u>Sealant for Sheet Metal Work</u>: Provided under this Section, but in compliance with requirements of Section <u>07 92 00 JOINT SEALANTS</u>.
 Unless otherwise indicated, provide the following:
 - 1) <u>Mastic Sealant</u>: Polyisobutylene, nonhardening, nonskinning, nondrying, non-migrating sealant.
 - c. Soffit.

1)

- "Flush Solid" and "Flush Narrow Vent" aluminum soffit as manufactured by Pac-Clad, or Architect approved equal.
 - a) <u>Material</u>: .033 aluminum.
 - b) <u>Exposure</u>: 7"
 - c) Roll formed to exact lengths.

- d) "J" Trim to match thickness and color.
- e) <u>Tests</u>: ASTM E330.
- f) Color selected by Architect from stock colors.

2. FABRICATION

- a. Shop-fabricate metal work to greatest extent possible.
 - 1) Fabricate for waterproof and weather-resistant performance with expansion provisions, sufficient to permanently prevent leakage, damage, or deterioration of the Work.
 - a) Form work to fit substrates.
 - b) Form exposed sheet metal Work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form Items.
- b. <u>Seams</u>: Fabricate non-moving seams in sheet metal with flat-lock seams of 1 inch minimum.
- c. <u>Expansion Provisions</u>: Where lapped or bayonet-type expansion provisions in Work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).
- d. <u>Sealant Joints</u>: Where movable, non-expansion type joints are indicated or required for proper performance of Work, form metal to provide for proper installation of sealant, in compliance with SMACNA standards.
- e. <u>Separations</u>: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with bituminous coating or other, permanent separation as recommended by fabricator.
- f. Provide end dams at non-continuous flashing turn up 1 1/2" minimum.

C. EXECUTION

- 1. EXAMINATION
 - a. <u>Verification of Conditions</u>. Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
 - b. Do not proceed until unsatisfactory conditions have been corrected.
- 2. INSTALLATION
 - a. Comply with fabricator's recommendations.
 - b. Except as otherwise indicated, comply with: SMACNA, "Architectural Sheet Metal Manual".
 - c. Furnish/fabricate and install metal flashing work in accordance with details and specifications of above Reference Standards, with manufacturer's instructions and as herein specified, to provide a watertight installation.

- d. Apply metal flashing to smooth, sound, even, clean, and dry surfaces free from defects.
- e. Make provisions to allow for expansion and contraction of metal flashing. Wherever practicable, shop form all metal flashing work and deliver to job site ready for installation.
- f. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges and corners, free from defects.
- g. Fold exposed metal edges back not less than 1/2" to form drip.
- h. Use cleats where sheets are more than 12" in width.
 - 1) Space cleats approximately 12" o. c. Cleats 2" wide x 3" long, of same material and weight as metal flashing being installed.
 - 2) Pre-tin cleats for soldered seams.
- i. Join metal flashings with 1" locked and soldered seams except at slip joints.
 1) Mallet seams flat and solder full length of seam as specified below.
- j. Locate slip joints not more than 24' apart and not more than 8' from corners.
 - 1) Form slip joints as 3" wide joints with cover piece behind flashing.
 - 2) Fill locked ends neatly with sealant.
- k. <u>Miscellaneous Flashing</u>: Furnish and install all other miscellaneous metal flashing not specifically mentioned herein but indicated on drawings and/or required to construct a watertight installation.
- I. <u>Separation of Dissimilar Metals</u>: Unless otherwise noted, back coat surfaces of metal flashing in contact with dissimilar metals, concrete, or masonry with bituminous paint

3. CLEANING

a. Clean exposed metal surfaces, removing substances, which might cause corrosion of metal or deterioration of finishes.

4. PROTECTION

a. Protect flashings and sheet metal Work during construction, to ensure that Work will be without damage or deterioration, other than natural weathering at time of substantial completion.

07 63 00 GUTTERS AND DOWNSPOUTS

A. <u>GENERAL</u>

1. SCOPE

a. This section covers furnishing and installing gutters, downspouts, braces, strainers, etc., as shown on the Drawings, as herein specified and/or as required for a complete job.

2. RELATED DOCUMENTS

a. Specification Section 07 62 00 SHEET METAL FLASHING AND TRIM.

B. MATERIALS

- 1. GUTTERS
 - a. Hung gutters shall be Alcoa 5" "OG" or "K" style constructed of .027 gauge aluminum, factory finished with color to be as selected by the Architect from the manufacturer's standard selection list.
 - b. All joints shall be locked and soldered except that expansion joints shall be locked only. In no case shall expansion joints be located at intervals exceeding 30'-0".
 - 1) Where gutter lengths are less than 30', provide one (1) expansion joint.
 - c. Gutters shall be installed with a slight pitch to downspout and shall be in pieces of not less than 8'-0" long.
 - 1) End joints shall be so spaced as to eliminate any piece shorter than 6'-0".
 - 2) Gutters shall be supported with strap hangers or by spikes with spacers designed for this purpose.
 - 3) Maximum spacing of hangers shall be 48" o.c.
- 2. DOWNSPOUTS
 - a. Provide metal downspouts on outside walls from all gutters as indicated.
 - b. Fabricate downspouts from same material and color as gutters.
 - c. Form downspouts to sizes and shapes indicated and as required.
 - d. Telescope end joints 1¹/₂" and lock longitudinal joints.
 - e. Fasten downspouts to walls with straps spaced not more than 6' apart.
 - f. Fasten straps to walls with nonferrous screws in plastic sleeves.
 - g. Provide elbows at bottom where downspouts empty onto splash blocks.
 - h. Form downspout head to design shown.
 - i. Size downspouts as follows:
 - 1) 2" x 3" x 19 ga. = Ground Floor Roof Areas only. (No upper roof drainage)
 - 2) $3'' \times 4'' \times 24$ ga. = Draining Upper Floor Roofs.

3. SOFFITS

a. See Section <u>07 46 46 FIBER CEMENT CLADDING, SIDING AND ACCESSORIES</u> for fiber cement soffits.

4. RAIN DIVERTERS

- a. Provide prefinished aluminum rain diverters as shown on the Drawings or as required.
- b. Color to be as selected by Architect.

5. CONNECTER ADAPTERS

a. Install PVC adaptors for the connection at each downspout to underground drainage piping where provided.

6. LEAF GUARDS

- a. Provide Leaf Defender Gutter Guard or Architect-approved equal on all new <u>and existing</u> gutters on the property.
- b. Leaf guards to be constructed of minimum 0.027 gauge aluminum with baked enamel finish.
- c. Provide size required by new and existing gutters.

C. EXECUTION

- 1. INSTALLATION
 - a. <u>Gutters</u>:
 - 1) Install gutters with concealed fasteners.
 - 2) Seal all joints.
 - 3) Install leaf strainer per manufacturer's recommendations.
 - b. <u>Downspouts</u>:

2)

- 1) Secure downspouts with clips and tamper-resistant brackets anchored in the masonry joints.
 - Install three (3) equally spaced downspout brackets at one-story downspouts.
 - a) Brackets shall be concealed.

07 84 00 FIRESTOPPING

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73</u> <u>00 SUPPLEMENTARY CONDITIONS</u> and sections included under Division <u>1</u> <u>GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein.
 - b. Section <u>09 21 16 GYPSUM BOARD ASSEMBLIES</u>: For non-fire resistive insulation.
 - c. Section <u>07 92 00 JOINT SEALANTS</u>: For sealants for non-fire resistive rated joint sealants.
 - d. Division <u>22 PLUMBING</u> and Division <u>23 HVAC AIR DISTRIBUTION</u> sections specifying ducts and piping penetrations.
 - e. Divisions <u>26 ELECTRICAL</u>, Division <u>27 COMMUNICATIONS</u> and Division <u>28</u> <u>ELECTRONIC SAFETY AND SECURITY</u> sections specifying cable and conduit penetrations.
 - 2. SCOPE
 - a. Provide labor, materials, services, coordination, and equipment necessary for complete installation of tested or engineering judgement based firestopping materials and systems. Section includes firestopping for the following:
 - 1) Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2) Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3) Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4) Sealant joints in fire resistance rated construction.
 - a) Gaps between the top of walls and ceilings or roof assemblies.
 - b) Openings around structural members which penetrate floors or walls.
 - 3. DEFINITIONS
 - a. <u>Firestopping</u>: Material or combination of materials to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.
 - b. <u>Through-Penetration Firestop Systems</u>: Material or combination of materials which are field constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.
 - c. <u>Through-Penetration Firestop Devices</u>:

- 1) Factory built products designed to resist fire spread.
- 2) Complete when delivered to site; ready for installation.

4. SYSTEM DESCRIPTION

- a. <u>General</u>: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- b. <u>F-Rated Through-Penetration Firestop Systems</u>: Provide through-penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.
- c. <u>T-Rated Through-Penetration Firestop Systems</u>:
 - 1) Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas.
 - 2) T-rated assemblies are required where specified by codes or where the following conditions exist:
 - a) Where firestop systems protect penetrations located outside of wall cavities.
 - b) Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
 - 3) Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.
 - 4) Where firestop systems protect penetrating items larger than a 4" diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- d. <u>Fire Resistive Joint Sealants</u>: Provide joint sealants with fire resistance ratings indicated, as determined per ASTM E119, UL 1479 and UL 2079 but not less than that equaling or exceeding the fire resistance rating of the construction in which the joint occurs.
- e. For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions and will meet load requirements.
 - 1) For piping penetrations for plumbing and wet pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2) For floor penetrations with annular spaces exceeding 4" in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3) For penetrations involving insulated piping, provide through-penetration firestop systems that do not require removal of insulation.
- f. For through-penetration firestop systems exposed to view, provide products with flame spread of less than twenty-five (25) and smoke developed ratings of less than four hundred fifty (450), as determined per ASTM E 84.

5. SUBMITTALS

a. <u>Product Data</u>: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used, and manufacturer's installation instructions.

- 1) Manufacturer's engineering judgement identification number and drawing details when no tested system is available.
- b. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 - 1) Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
 - 2) Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer with modifications marked.
- c. Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements.
 - 1) Certification shall be signed by the Installer.
- d. Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.
- e. The Firestopping Contractor shall provide a letter of certification stating that all firestopping systems have been installed in accordance with the Contract Documents.

6. QUALITY ASSURANCE

- a. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- b. Meet requirements of ASTM E814 or UL1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.
 - 1) ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."
 - 2) ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."
- c. Installer Qualifications:
 - Engage an experienced Installer, successfully completed at least three (3) firestop projects similar in type and size to that of this Project, who is certified or licensed as having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
 - 2) A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not itself confer qualification on the buyer.
- d. <u>Single Source Responsibility</u>: Obtain through-penetration firestop systems for kind of penetration and construction condition indicated from a single manufacturer.
- e. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".
- f. Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.

- g. <u>Coordinating Work</u>: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- h. <u>Fire-Test-Response Characteristics</u>: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" article:
 - 1) Firestopping tests are performed by a qualified testing and inspecting agency.
 - A qualified testing and inspecting agency is UL or another agency performing test and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2) Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a) Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b) Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system listed by the following:
 - (i) UL in "Fire Resistance Directory".

7. DELIVERY, STORAGE AND HANDLING

- a. Deliver firestopping undamaged products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
 - 1) Comply with recommended procedures, precautions, or remedies described in material safety data sheets as applicable.
- b. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- c. Do not use damaged or expired materials.
- 8. PROJECT CONDITIONS
 - a. <u>Environmental Conditions</u>: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
 - b. <u>Ventilation</u>: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

9. SEQUENCING AND SCHEDULING

- a. Coordinate this work as required with work of other trades. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- b. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

B. PRODUCTS

1. MANUFACTURERS

- a. Subject to compliance with through-penetration firestop systems (XHELZ) listed in Volume II of the UL Fire Resistance Directory, provide products by one of the following:
 - 1) Hilti Construction Chemicals, Tulsa, Oklahoma
 - 2) Specified Technologies, Inc., (STI), Sommerville, New Jersey
 - 3) 3M Fire Protection Products, St. Paul, Minnesota
 - 4) Tremco, Inc., Beachwood, Ohio
- 2. FIRESTOPPING, GENERAL
 - a. <u>Compatibility</u>: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
 - 1) All materials shall comply with ASTM E814 or E119 (UL 1429), and shall be manufactured of non-toxic, non-hazardous, asbestos free materials, and unaffected by water or moisture when cured.
 - 2) <u>Primers</u>: Conform to manufacturer's recommendations for primers required for various substrates and conditions.
 - 3) <u>Backup Materials</u>: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.
 - b. <u>Accessories</u>: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1.
 - 1) Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems.
 - 2) Accessories include but are not limited to the following items:
 - a) Permanent forming/damming/backing materials must be noncombustible and may include the following:
 - (i) Semi-refractory Fiber (mineral wool) Insulation.
 - (ii) Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - (iii) Joint fillers for joint sealants.
 - b) Temporary Forming Materials.
 - c) Substrate Primers.
 - d) Collars.
 - e) Steel Sleeves.

3. FIRESTOPPING, MATERIALS

- a. Use only firestopping products that have been UL 1479 or ASTM E814 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.
- b. For penetrations by non-combustible items including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following materials are acceptable:
 - 1) Hilti; FS-ONE High Performance Intumescent Firestop Sealant
 - 2) STI; Sealant SSS 100
 - 3) 3M; Fire Barrier CP25 WB+ or Fire Barrier Silicone Sealant 2000
 - 4) Tremco, Inc.; Tremstop Silicone Fyre-Sil Sealant

- c. For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems), the following materials are acceptable:
 - 1) STI; Wrap Strip SSW
 - 2) Hilti; FS One High Performance Intumescent Firestop Sealant or CP 648 wrap strip.
 - 3) 3M; Fire Barrier FS-195+ Wrap Strip or Fire Barrier CP25 WB+
 - 4) Tremco; Tremstop WS Intumescent wrap strip
- d. For penetrations by combustible plastic pipe (open piping systems), the following materials are acceptable:
 - 1) Hilti; CP 643 Firestop Collar or FS-ONE High Performance Intumescent Firestop Sealant.
 - 2) 3M; Fire Barrier PPD Plastic Pipe Device.
- e. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following materials are acceptable:
 - 1) STI; SSM firestop mortar.
 - 2) Hilti; CP 637 Firestop Mortar or FS 657 FIREBLOCK.
 - 3) 3M; Fire Barrier mortar or Fire Barrier Self-Locking Pillows.
 - 4) Tremco; Tremstop PS Pillow System.
- f. For fire rated construction joints and other gaps with movement the following materials are acceptable:
 - 1) Hilti CP601S Silicone Firestop Sealant or CP 604 Self-Leveling Firestop Sealant
 - 2) STI; Pen 300
 - 3) 3M; Fire Barrier CP25 WB+
 - 4) Tremco; Tremstop Acrylic Sealant
- g. Provide a firestopping system with an "F" rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- h. Provide a firestop system with an assembly rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.
- 4. MIXING
 - a. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

C. EXECUTION

- 1. EXAMINATION
 - a. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping.
 - b. Do not proceed with installation until unsatisfactory conditions have been corrected.

c. Verify penetrations are properly sized and in suitable condition for application of materials.

2. PREPARATION

- a. <u>Surface Cleaning</u>: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1) Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2) Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping.
 - 3) Remove loose particles remaining from cleaning operation.
 - 4) Remove laitance and form release agents from concrete.
- b. <u>Priming</u>: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods.
 - 1) Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- c. <u>Masking Tape</u>: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials.
 - 1) Remove tape as soon as possible without disturbing firestop systems seal with substances.

3. INSTALLING THROUGH-PENETRATION FIRESTOPS

- a. <u>General</u>: Comply with the "System Description" requirements in Part A and the throughpenetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- b. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through penetration firestop systems.
 - 1) After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- c. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
 - 1) Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 2) Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3) For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

4. INSTALLING FIRE RESISTIVE JOINT SEALANTS

a. <u>General</u>: Comply with the "System Performance Requirements" in Part 1, with ASTM C1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

- b. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- c. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability.
 - 1) Install sealants at the same time joint fillers are installed.
- d. Tool non-sag sealants immediately after sealant application and prior to the time skinning or curing begins.
- e. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint.
- f. Remove excess sealant from surfaces adjacent to joint.
- g. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

5. IDENTIFICATION

- a. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels.
 - 1) Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.
 - 2) Include the following information on labels:
 - a) The words "Warning Through-Penetration Firestop System Do Not Disturb. Notify Building Management of Any Damage".
 - b) Contractor's name, address, and phone number.
 - c) Through-penetration firestop system designation of applicable testing and inspecting agency.
 - d) Date of installation.
 - e) Through-penetration firestop system manufacturer's name.
 - f) Installer's name.

6. CLEANING

- a. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which openings and joints occur.
- b. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion.
 - 1) If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

07 92 00 - JOINT SEALANTS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of the Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00</u> <u>73 00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1 GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein.
 - 2. SCOPE
 - a. This section includes furnishing all labor and materials required to seal where wood, metal, masonry, and concrete meet.
 - b. Do all other caulking necessary to complete the work as shown on the Drawings and/or as herein specified.
 - 3. JOB REQUIREMENTS
 - a. Sealant and caulking color to be selected by Architect from manufacturer's standards.
 - b. All interior sealants and adhesives shall be low VOC.
 - 4. SURFACE HARDNESS
 - a. Provide types of sealant to withstand anticipated abrasive or possible indentation as recommended by manufacturer.
 - 5. SUBMITTALS
 - a. Submit product data and installation recommendations, including joint preparation instructions for each material provided.
 - b. Submit at jobsite complete color charts or sample kits for each exposed sealant and caulking material provided.
 - 1) <u>Samples for Selection Purposes</u>: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available for each product exposed to view.
 - 6. DELIVERY, STORAGE AND HANDLING
 - a. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
 - b. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
 - 7. PROJECT CONDITIONS

- a. Preparation of joint surfaces, backing, and the conditions under which the sealant and caulking is to be installed shall conform to manufacturer's recommendations.
 - 1) Use of bond break tape is prohibited without the expressed permission of the Architect.
 - 2) Each situation will be evaluated with regard to inability to properly use backer rod to prevent adhesion.

8. ENVIRONMENTAL CONDITIONS

- a. Do not proceed with installation of joint sealants under the following conditions:
 - 1) When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 - 2) When joint substrates are wet.

9. JOINT WIDTH CONDITIONS

- a. Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- 10. JOINT SUBSTRATE CONDITIONS
 - a. Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. Subject to compliance with the requirements, provide products by Dow Corning Corp., Midland, Michigan.

2. MATERIALS

- a. <u>General</u>:
 - 1) Where the term "Acceptable Standard" is used within this section, it refers to the manufacturer and product listed, which is specified as the type and quality required for this Project.
 - 2) Single source responsibility for joint sealer materials.
 - a) Obtain joint sealer materials from a single manufacturer for each different product required.
 - 3) <u>Compatibility</u>: Provide joint sealers, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and final experience.
 - 4) All products to be used at the interior shall be low VOC .
- b. <u>Caulking Compounds (Acrylic Latex Sealant)</u>: Shall be used at interior in dry areas with little joint movement.
 - 1) Latex rubber modified, acrylic emulsion polymer sealant compound; manufacturer's standard, one part, non-sag, mildew resistant, acrylic emulsion sealant complying with ASTM C 834, formulated to be paintable
and recommended for exposed applications on interior locations involving joint movement of not more than $\pm 5\%$.

- c. <u>One-Part Elastomeric Sealant (Silicone)</u>: Shall be used at plumbing fixtures and where exposed to water at the interior.
 - One (1) component elastomeric sealant, complying with ASTM C 920, Class 25, Type NS (non-sag), unless Type S (self-leveling) recommended by manufacturer for the application shown.
 - 2) One (1) component mildew resistant silicone sealant.
 - 3) One (1) component high movement joints (+100/-50):
 - a) Where locations of high movement are indicated.
- d. <u>Elastomeric Sealant (Polyurethane)</u>: Shall be used where weatherproofing or waterproofing is required.
 - 1) One (1) component polyurethane sealant, complying with ASTM C 920, Type S, Grade NS, Class 25 (non-sag).
 - 2) Two (2) component polyurethane sealant, complying with ASTM C 920, Type M, Grade NS, Class 25 (non-sag).
- e. <u>Concrete Joint Sealant</u>: Shall be used at concrete joints.
 - 1) Two (2)component elastomeric sealant.
 - a) Add sand to wet caulk to match concrete color and texture.
 - 2) Sand shall be clean and uniformly well-graded, conforming to ASTM C144.
 a) Color shall match concrete as closely as possible.
 - a) Color shall match concrete as closely as po
- f. <u>Miscellaneous Materials</u>:
 - 1) Provide joint cleaner and joint primer sealer as recommended by the sealant or caulking compound manufacturer.
 - 2) Sealant backer rod shall be compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other material as recommended by the sealant manufacturer.
 - a) Where a building expansion joint is indicated, provide an expanding foam secondary sealant, "BackerSeal" as manufactured by Emseal Joint Systems, Ltd., Westborough, MA, or APolytite Standards as manufactured by Polytite Manufacturing Corporation, Cambridge, MA, behind sealant in lieu of standard backer rod.
 - 3) <u>Primer</u>: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate tests and field tests.
 - 4) <u>Acoustical Sealant</u>: Refer to Section <u>09 21 16 GYPSUM DRYWALL</u> <u>ASSEMBLIES</u>.
 - 5) <u>Cleaners for Non-Porous Surfaces</u>: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent non-porous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in service performance.
 - 6) <u>Masking Tape</u>: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

C. EXECUTION

1. EXAMINATION

- a. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.
- b. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

2. PREPARATION

- a. <u>Surface Cleaning of Joints</u>: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 - 1) Remove foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.
 - 2) Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers.
 - a) Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.
 - 3) Remove laitance and form release agents from concrete.
 - 4) Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- b. <u>Joint Priming</u>: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer substrate tests or prior experience.
 - Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond; do not allow spillage or migration onto adjoining surfaces.
- c. <u>Masking Tape</u>: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears.
 - 1) Remove tape immediately after tooling without disturbing joint seal.

3. SELECTION OF MATERIAL

- a. Caulking compounds shall be used for interior non-moving joints and at locations indicated.
- b. One (1) or two (2) component elastomeric polyurethane sealants shall be used at exterior and interior joints where weatherproofing or waterproofing is required and at exterior and interior joints between dissimilar materials including, but not limited to, the following locations:
 - 1) Lintels and shelf angles to masonry construction.
 - 2) Louvers to adjacent construction.

- 3) Vertical interior expansion joints and horizontal control joints and expansion joints in the building.
- 4) Sealant in pipe sleeves where materials must perforate the floor slab.
- 5) Perimeter of floor slabs or concrete curbs which abut vertical surfaces.
- 6) Interior joints between dissimilar materials where the joining of the two surfaces leave a gap between the meeting materials and components.
- 7) Exterior joints, such as window or door perimeters.

4. INSTALLATION

- a. <u>General</u>: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
 - 1) Interior joints which require caulking are to be caulked with the specified caulking compound, unless noted otherwise.
 - 2) Joints to be filled shall be thoroughly dry and free from dust, dirt, oil, and grease at the time of application of caulks or sealants.
 - 3) <u>Masking</u>: Metal shall be masked with masking tape, as well as other surfaces where its required to prevent the sealant smearing the adjacent surface.
 - a) Upon completion of the caulking, remove the tape.
- b. Prime or seal the joint surfaces.
- c. Install sealant backer rod of the proper size for the joint to be sealed at locations receiving sealants and as recommended by sealant manufacturer.
 - 1) Do not split (longitudinally cut) backer rod, cut to length only.
 - 2) Install expanding foam secondary sealant at 2 " expansion joints in masonry as recommended by sealant manufacturer.
- d. Employ only proven installation techniques.
- e. Install sealants to depths shown or as recommended by manufacturer.
- f. Do not allow sealants to spill or stain adjoining surfaces.
- g. Remove spillage promptly without damage to the adjoining surfaces.
- h. <u>Tooling of Non-Sag Sealants</u>:
 - Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.
 - 2) Remove excess sealants from surfaces adjacent to joint.
 - 3) Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 4) Provide concave joint configuration per figure 5A in ASTM C 1193, unless otherwise indicated.
- i. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.

1) If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately, and the repaired areas shall be made indistinguishable from original work.

08 11 13 - HOLLOW METAL DOORS AND FRAMES

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of the Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00</u> <u>73 00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1 GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein
 - b. See Section 07 92 00 JOINT SEALANTS
 - c. See Section <u>08 71 00 DOOR HARDWARE</u>
 - d. See Section <u>09 91 00 PAINTING</u>
 - 2. SCOPE
 - a. This section covers furnishing and installing all hollow metal frames as shown on the Drawings and/or as required for the work specified.
 - 3. HARDWARE PREPARATION
 - a. All frames shall be accurately prepared for door hardware.
 - b. Templates are to be furnished by the Contractor.
 - 4. SHOP PAINTING
 - a. Thoroughly clean frames and apply one coat of manufacturer's high-performance standard primer.
 - 5. FIELD DIMENSIONS
 - a. All opening sizes shall be verified in the field by Contractor prior to fabrication.
 - 6. SUBMITTALS
 - a. Product data for each type of frame specified, including details of construction, materials, dimensions, hardware preparation, label compliance, profiles, and finishes.
 - b. Shop drawings shall show door frame types and details, wall opening construction details, weatherstripping, and finish requirements.
 - 1) Provide schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings and Schedules.
 - 7. QUALITY ASSURANCE
 - a. Provide frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.
 - b. <u>Fire-Rated Door Assemblies</u>: Units that comply with NFPA 80 are identical to door and frame assemblies tested for fire-test-response characteristics per

ASTM E152 and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

8. DELIVERY, STORAGE AND HANDLING

- a. Deliver frames cardboard wrapped, crated, palletized or otherwise protected during transit and site storage.
- b. Inspect frames upon delivery for damage.
 - 1) Minor damages may be repaired provided refinished items are equal in all respects to new work and accepted by the Architect.
 - 2) Otherwise remove and replace damaged items.
- c. Store frames at the building site in a dry, secure place.
 - 1) Place on minimum 4" high wood blocking.
 - 2) Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber.
 - 3) If cardboard wrapper/packaging becomes wet, remove packaging materials immediately.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. Products of the following manufacturers will be considered, providing their products equal or exceed the quality specified, and they can provide products of the type, size, function, and arrangement required.
 - 1) Curries, Mason City, Iowa
 - 2) Steelcraft, Cincinnati, Ohio
 - 3) The Ceco Corp., Chicago, Illinois
 - 4) Amweld Building Products Division, Niles, Ohio

2. MATERIALS

- a. <u>Cold-Rolled Steel Sheets</u>: Commercial quality carbon steel, complying with ASTM A366 and ASTM A568.
- b. <u>Galvanized Steel Sheets</u>: Zinc-coated carbon steel sheets of commercial complying with ASTM A525, G60 zinc coating, mill phosphatized.
- c. <u>Supports and Anchors</u>: Fabricate of not less than 18-gauge galvanized sheet steel.
- d. <u>Inserts, Bolts, and Fasteners</u>: Manufacturer's standard units, except hot dip galvanized items to be built into exterior walls, complying with ASTM A153, Class C or D as applicable.
- e. <u>Shop Applied Paint</u>: For steel surfaces, use rust-inhibitive enamel or paint, either air drying or baking, suitable as a base for specified finish paints.
- 3. DOOR TYPES
 - a. The following door types shall conform to the Steel Door Institute Standards as described in SDI 100-91.

- b. <u>Exterior Doors</u>:
 - 1) Basis of Design: Steelcraft Series LF16
 - a) 1³/₄" heavy duty, 16-gauge, cold rolled, flush panel or embossed (see Door Schedule), seamless edge design, galvanized with polystyrene core.
 - b) Door face sheet shall be formed from one sheet of metal with no seams on the door face.
 - (i) Both lock and hinge rail edge of the door shall be continuously welded, full height of the door, with welds ground smooth.
 - (ii) The top and bottom of the door shall be closed with a recessed channel end closure.
 - c) Provide labeled metal door and frame assemblies tested in accordance with NFRC 400 to meet the following:
 - (i) <u>Opaque Doors</u>: Maximum U-value of 0.70.
 - (ii) <u>Doors with Glazing</u>: Maximum U-Value of 0.55.
 - (iii) Solar Heat Gain Coefficient (SHGC): 0.40 maximum.
 - d) Air leakage shall not exceed 1.0 cfm/ft² for glazed swinging entrance doors and 0.4 cfm/ft² for all other doors.
- c. Lock edges of doors shall be beveled 1/8" in 2".
- d. All doors shall conform to ANSI A250.4 level 'A' criteria and be tested to 1,000,000 operating cycles and 23 twist tests.
 - 1) Certification of level 'A' doors is to be submitted with approval drawings.
- e. Provide approved and labeled metal doors at locations indicated in Door Schedule and on Drawings.
 - Approved doors shall be constructed and installed in accordance with requirements of NFPA 80 and tested by UL (Underwriters Laboratories, Inc.) or WH (Warnock Hersey) per Uniform Building Code Standard 7-2, (positive pressure tested) "Fire Tests of Door Assemblies" for the class of door opening indicated in schedules.
- 4. FRAME TYPES
 - a. <u>Masonry</u>:
 - 1) <u>Basis of Design</u>: Steelcraft Series MV14
 - a) Frames shall be fabricated of either cold-rolled or galvanized steel (exterior frames), 16-gauge at interior frames and 14-gauge at exterior frames.
 - b) Joints are to be die mitered with integral tabs for reinforcement and interlocking of the jambs to the head.
 - c) Frames shall be set-up and welded.
 - b. Drywall (Common Areas and Unit Entries):
 - 1) Basis of Design: Steelcraft Series DW16
 - a) Frames shall be fabricated of either cold-rolled or galvanized steel (exterior frames), 16-gauge at interior frames and 14 gauge at exterior frames.
 - b) Frames shall be knock-down, double return, back bend, flush hairline seam.
 - c) Miter at the corner of the head and jamb, and the corner reinforced with a concealed clip.

d) Each jamb is to have one compression anchor to securely hold the frame between the studs and maintain proper alignment.

5. FRAME ASSEMBLIES

- a. <u>Stops and Beads</u>:
 - 1) Furnish 20-gauge metal glazing beads with the hollow metal frames at locations where beads are indicated in pressed steel frames.
 - 2) Glazing beads for exterior frames shall be on the interior side of lights.
 - 3) Glazing beads for interior frames shall be on the same side as door.
- b. <u>Plaster Guards</u>: Provide 26-gauge steel plaster guards or mortar boxes, welded to the frame, at back of door hardware cutouts where mortar or other materials might obstruct hardware operation.
- c. Provide 9-gauge hinge reinforcement.
 - 1) Provide 1/8" steel backer plate full length of frame for reinforcement at all doors with continuous hinges.
- d. Provide minimum 12-gauge frame head reinforcement for closers, surface, and concealed overhead stop and holders, removable mullions, flush bolts, and top latch of vertical rod exit devices.
- e. <u>Door Silencers</u>: Drill stops and install three (3) silencers on strike jambs of single swing frames and two (2) silencers on heads of double swing frames; one (1) per door leaf.
- f. Hollow metal frames requiring continuous gear hinges shall have a continuous mortar guard of foam or cardboard by the frame height, applied with construction adhesive.
 - 1) Mortar guards to be field applied.

6. FIRE RATED FRAMES

- a. Provide approved and labeled hollow metal frames at locations indicated in Door Schedule and on Drawings.
- b. Approved frames and hardware shall be constructed and installed in accordance with requirements of NFPA 80 and tested by UL (Underwriters Laboratories, Inc.) or WH (Warnock Hersey) per Uniform Building Code Standard 7-2, (positive pressure tested) "Fire Tests of Door Assemblies" for the class of door opening indicated in schedules.
- c. Labeled metal frames are required for labeled wood doors.
- 7. FABRICATION
 - a. Fabricate steel frames to be rigid, neat in appearance, and free from defects, warp, or buckle.
 - 1) Accurately form metal to required sizes and profiles.
 - 2) Wherever practicable, fit and assemble units in the manufacturer's plant.
 - 3) Clearly identify
 - b. Work that cannot be permanently factory assembled before shipment, to assure proper assembly at the project site.

- c. Sizes, types, and assemblies shall be as indicated on the Drawings, Door and Hardware Schedule, and as specified herein.
- d. <u>Exposed Fasteners</u>: Unless otherwise indicated, provide countersunk phillips flatheads for exposed screws and bolts.
- e. <u>Shop Painting</u>:
 - 1) Clean, treat, and paint exposed surfaces of fabricated hollow metal doors and frames, including galvanized surfaces.
 - a) Back prime exterior hollow metal door frames.
 - 2) Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.
 - 3) Apply shop coat of prime paint of not less than 1.0 mil without runs, smears, or bare spots ready to receive field applied paint.

C. EXECUTION

- 1. FIELD QUALITY CONTROL
 - a. <u>Frames</u>:
 - 1) Remove any temporary shipping bars before setting frames.
 - 2) Install plumb, level and true to line, secured in openings.
 - 3) Install frames in accordance with accepted shop drawings, manufacturer's printed instructions.
 - b. <u>Final Adjustment</u>: Doors, Frames and hardware shall receive final adjustment as follows:
 - 1) <u>Door Contact with Silencers</u>: Doors shall strike a minimum of two silencers without binding lock or latch bolts in the strike plate.
 - 2) <u>Head, Strike and Hinge Jamb Margin</u>: 1/8".
 - 3) <u>Meeting Edge Clearance, Pairs of Doors</u>: +1/16".
 - 4) <u>Bolts and Screws</u>: Leave tight and firmly seated.
 - c. Damaged work will be rejected and shall be replaced with new work.

2. PROTECTION

- a. Protect frames from damage during transportation and at the jobsite; store at the site under cover on wood blocking or on suitable floors.
- b. After installation, protect frames from damage during subsequent construction activities.

08 13 16 - ALUMINUM DOORS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to work of this section.
 - 2. SUMMARY
 - a. Extent of aluminum doors are indicated on drawings and schedules.
 - b. Aluminum doors required for the project include:
 - 1) Exterior entrance doors and frames in aluminum storefront system.
 - 2) Glazing for the above
 - c. Aluminum storefront and window are specified in Section <u>08 41 13 ALUMINUM</u> <u>STOREFRONT FRAMING AND WINDOWS.</u>
 - d. Coordinate responsibility for aluminum entrance door hardware with Section <u>08</u> <u>71 00 DOOR HARDWARE.</u>
 - 3. SYSTEM DESCRIPTION-EXTERIOR DESCRIPTION
 - a. <u>Performance Requirements</u>: Provide aluminum entrance and storefront assemblies that comply with the following performance characteristics:
 - 1) <u>Thermal Movement</u>: Provide systems capable of withstanding thermal movements resulting from a temperature range of 200° F.
 - 2) <u>Wind Loading</u>: Provide assemblies capable of withstanding a uniform test pressure of 30 psf inward and 20 psf outward when tested in accordance with ASTM E 330.
 - 3) <u>Air Infiltration</u>:
 - a) <u>Entrances</u>: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.
 - 4) <u>Water Penetration</u>: Provide framing system with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.
 - 5) <u>Condensation Resistance</u>: Exterior framing systems are "thermal-break" construction. Provide units tested for thermal performance in accordance with AAMA 1 502 showing condensation resistance factor (CRF) of not less than 50.
 - 6) <u>Thermal Transmittance</u>: Provide framing systems that have an overall Uvalue of not more than 0.65 BTU/(hr. x sq. ft. x deg. F) at 1 5 mph exterior wind velocity when tested in accordance with AAMA 1503.
 - 4. SUBMITTALS

- Product Data: Submit manufacturer's product specifications, technical product a. data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information: 1)
 - Fabrication Methods:
 - Finishing a)
 - Hardware b)
 - Accessories. C)
- Shop Drawings: Submit shop drawings for fabrication and installation of b. entrances and storefronts, including the following:
 - 1) Elevations.
 - 2) Detail sections of typical composite members.
 - Hardware, mounting heights. 3)
 - Anchorages and reinforcements. 4)
 - 5) Expansion provisions.
 - Glazing details. 6)
- Samples: Submit pairs of samples of each type and color of aluminum finish, on c. 12" long sections of extrusions or formed shapes and on 6" square sheets. Where color or texture variations are anticipated, include two (2) or more units in each set of samples indicating extreme limits of variations.
- d. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.
- 5. QUALITY ASSURANCE
 - Single Source Responsibility: Provide entrance and storefront produced by a a. single manufacturer capable of showing prior production of units similar to those required.
 - Installer's Qualifications: Entrances and storefront shall be installed by a firm that b. has not less than five (5) years successful experience in the installation of systems similar to those required.
- 6. **PROJECT CONDITIONS**
 - Field Measurements: a.
 - Field measure openings before fabrication to ensure proper fitting of 1) work; show measurements on final shop drawings.
 - 2) Coordinate fabrication schedule with construction progress to avoid delay in the work.
 - Where necessary, begin fabrication without field measurement; 3) coordinate fabrication tolerances to ensure proper fit.
- 7. WARRANTY
 - Special Product Warranty: a.
 - Submit a written warranty, executed by the Contractor, Installer and 1) Manufacturer, agreeing to repair or replace units (including re-glazing) which fail in materials or workmanship within five (5) years from Substantial Completion of the building.
 - Failures include, but are not necessarily limited to, structural failures 2) including excessive deflection, excessive leakage or air infiltration, faulty

operation, and deterioration of metals, metal finishes and other materials beyond normal weathering.

3) This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Manufacturer</u>: Subject to compliance with requirements, provide products of one of the following:
 - 1) EFCO
 - 2) Kawneer Company, Inc.
 - 3) Tubelite Div., Indal Inc.
 - 4) Vistawall Architectural Products.
 - 5) YKK AP America

2. MATERIALS

- a. <u>Aluminum Members</u>: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- b. <u>Fasteners</u>: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.
- c. <u>Reinforcement</u>: Where fasteners screw-anchor into aluminum, reinforce the interior with 3/8" aluminum.
- d. <u>Exposed Fasteners</u>:
 - 1) Except where unavoidable for application for hardware, do not use exposed fasteners.
 - 2) For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
- e. <u>Concealed Flashing</u>: Provide 26-gauge minimum dead-soft stainless steel, or 0.026["] minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- f. <u>Brackets and Reinforcements</u>: Provide concealed 3/8" thick aluminum reinforcement at hinge and closer locations and elsewhere as required.
- g. <u>Sliding Weatherstripping</u>: Provide the manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.
- h. <u>Glass and Glazing Materials</u>:
 - 1) In exterior aluminum doors, provide tempered, insulating glass designed to fit within the door framing.
 - 2) Gray tinted to match other exterior window glass.
- 3. COMPONENTS

- a. <u>Aluminum Door Frames</u>:
 - 1) Fabricate tubular and channel frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support required loads.
 - 2) Minimum aluminum wall thickness = .125".
- b. <u>Stile-and-Rail Type Aluminum Doors</u>:
 - Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
 - 2) <u>Design</u>: Provide minimum 1 3/4" thick, wide stile doors with the design and member sizes indicated on the drawings.
 - 3) <u>Glazing</u>: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails.
 - a) Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

4. HARDWARE

- a. <u>General</u>: Refer to hardware Section <u>08 71 00 DOOR HARDWARE</u> for requirements for hardware.
- b. Fabricate aluminum doors for the specified hardware.
 - 1) Reinforce for hinges, closers, rim devices or other exit devices.

5. FABRICATION

- a. <u>General:</u>
 - 1) Sizes of door and frame units, and profile requirements, are indicated on drawings.
 - 2) Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- b. <u>Prefabrication</u>:
 - 1) Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible.
 - 2) Disassemble components only as necessary for shipment and installation.
- c. <u>Reinforcing</u>: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.
- d. <u>Dissimilar Metals</u>: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- e. <u>Continuity</u>: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- f. <u>Uniformity of Finish</u>: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.

- 6. FINISHES
 - a. Anodize all exposed surfaces with minimum 7 mil Architectural Class 1 coating.
 1) <u>Color</u>: Match storefront windows.

C. EXECUTION

- 1. INSTALLATION
 - a. Comply with manufacturer's instructions and recommendations for installation.
 - b. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels.
 - 1) Provide proper support and anchor securely in place.
 - c. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
 - 1) Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101.
 - d. Drill and tap frames and apply surface-mounted hardware items.
 - 1) Comply with hardware manufacturer's instructions and template requirements.
 - 2) Use concealed fasteners wherever possible.
 - e. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weather tight construction.
 - 1) Comply with requirements of Division <u>7 THERMAL AND MOISTURE</u> <u>PROTECTION</u> for sealant, fillers, and gaskets.

2. ADJUSTING

- a. Adjust operating hardware to function properly, for smooth operation without binding, and for weather tight closure.
- 3. CLEANING
 - a. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
 - b. Clean glass surfaces after installation.
 - 1) Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

4. PROTECTION

a. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

08 14 00 - WOOD DOORS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of the Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00</u> <u>73 00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1 GENERAL REQUIREMENTS</u>, are included as a part of this section as though bound herein.
 - b. See Section <u>08 11 13 HOLLOW METAL DOORS AND FRAMES</u> for door frames and installation.
 - c. See Section 08 71 00 DOOR HARDWARE.
 - 2. SCOPE
 - a. <u>This section includes the following:</u>
 - 1) Doors with wood veneers.
 - 2) Factory preparation of wood doors for hardware specified in Section 08 71 00 DOOR HARDWARE.
 - 3. SUBMITTALS
 - a. <u>Product Data</u>: Submit door manufacturer's product data, specifications, and installation instructions for each type of wood door.
 - 1) Include details of core and stile construction, trim for openings and similar components.
 - 2) Include certifications as may be required to show compliance with specifications.
 - b. <u>Shop Drawings</u>: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing, and other pertinent data.
 - 1) Provide schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings and Schedules.
 - c. Submit samples in duplicate of the following materials to the Architect for approval. <u>Approval must be obtained prior to fabrication for</u>:
 - 1) Sections showing door construction.
 - 2) Finish color samples for prefinished wood doors.

4. QUALITY ASSURANCE

- a. All doors shall meet quality standards of Architectural Woodwork Institute
- b. <u>Manufacturer</u>: Obtain doors from a single manufacturer to ensure uniformity in quality of appearance and construction, unless otherwise indicated.
- c. Doors shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this section.

5. DELIVERY, STORAGE AND HANDLING

- a. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced ANSI standard and recommendations of NWMA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors," as well as with manufacturer's instructions.
- b. Identify each door with individual opening numbers that correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable, or concealed markings.
- c. Polybag protect each door for shipment and handling.
- 6. PROJECT CONDITIONS
 - a. <u>Environmental Limitations</u>: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.
- 7. WARRANTY
 - a. The manufacturer shall warrant each separate door installation against manufacturing defects for the lifetime of original installation, including cost of refinishing and rehanging.
 - b. <u>Contractor's Responsibilities</u>: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. Products of the following manufacturers will be considered, providing their products equal or exceed the quality specified, and they can provide products of the type, size, function, and arrangement required.
 - 1) Eggers Hardwood Products Corporation, Neenah, Wisconsin
 - 2) Masonite Corporation
 - 3) Algoma Hardwoods, Inc., Algoma, Wisconsin
 - 4) VT Industries, Holstein, Iowa
 - 5) Mohawk Doors, North Cumberland, Pennsylvania
 - 6) Jeld-Wen Doors

2. MATERIALS AND COMPONENTS

- a. Provide doors as indicated on Drawings conforming to the following requirements:
 - 1) <u>Door Type</u>:
 - a) <u>Common Area Doors</u>:
 - (i) Shall be solid core wood doors, prefinished, plain sliced maple, "A" face grade wood veneer, 1-3/4" thick.
 - (ii) Prep doors for hardware.

- (iii) Fire ratings, glazing, and profile shall be as indicated on the Door Schedule.
- b) <u>Apartment Entry Door</u>:
 - (i) Shall be solid core wood doors, 20-minute rated, prefinished, plain sliced maple, 1-3/4" thick.
 - (ii) Prep doors for hardware.
 - (iii) Fire ratings, glazing, and profile shall be as indicated on the Door Schedule.
- c) <u>Apartment Interior Doors</u>:
 - (i) All apartment interior doors shall be pre-hung hollow core wood with factory prime finish.
 - (ii) Profile shall be as indicated on the Door Schedule.
- 2) <u>Core Construction</u>:
 - a) <u>Non-Rated Doors</u>: See Door Type.
 - b) <u>Fire-Rated Doors</u>: Fire-rated mineral core.
 - (i) Fire-rated doors shall be positive pressure type, category 'A' doors with integral intumescent weatherstripping built into door edges.
- 3) <u>Core/Edge Interface</u>: Bonded.
- 4) <u>Edges</u>:
 - a) <u>Top and Bottom</u>: Mill option hardwood.
 - b) <u>Vertical</u>: Provide veneer wrapped edges over mill option hardwood stiles.
- 5) <u>Face Panels</u>: Manufacturer's standard 5-plywood veneer with Type I glue.
- 6) <u>Crossbands</u>: 1/16" minimum high-density hardboard.
- 7) <u>Matching</u>: Pairs of doors and banks of doors shall be matched as sets on both sides.
- b. <u>Vision Panel and Hardware Clearance Dimensions</u>: Where interior non-rated wood doors are shown-with lite cutouts which exceed the allowable height, width, or percent of area of door, or-lock-to-cutout dimension is less than manufacturer allows for lifetime warranty for structural composite lumber core doors, provide doors of engineered hardwood composite lumber (LSL) construction with lifetime warranty.
- c. Door Accessories shall be as follows:
 - 1) <u>Glass Stops</u>:
 - a) <u>Non-Rated Doors</u>: Door supplier shall provide wood stops for non-rated doors.
 - (i) <u>Stop to be flush with face veneer;</u> recessed stops not acceptable.
 - b) <u>Fire-Rated Doors</u>: Door supplier shall provide veneer wrapped rolled steel stops for fire-rated doors.
 - (i) Veneer to be same species as door.
 - (ii) <u>Stops to be flush with face veneer;</u> recessed stops not acceptable.
 - 2) <u>Glass:</u>
 - a)1/4" Tempered1/4" Clear Tempered Safety Glass: "Herculite K" by PPG Industries, Inc.; "Tuf-flex Tempered Safety Glass" by LOF; or "Safeglaze" by Guardian.
 - 3) Pairs of wood doors with 3-point latching, lockset and flush bolts, shall

be supplied with steel edges and steel astragal, factory prepared for hardware as scheduled.

- a) Astragal shall be mounted on key side of doors.
- b) Where active leaf is RH (right hand) or LH (left hand), the astragal shall be mounted on the <u>inactive leaf</u> and overlap the active leaf.
- c) Where the active leaf is RHR (right hand reverse) or LHR (left hand reverse), the astragal shall be mounted on the <u>active leaf</u> and overlap the inactive leaf.
- d) For special beveling requirements for pairs of doors, see Article B.3.a.
- 4) <u>Lock Blocks</u>: Manufacturer shall provide lock blocks for mortise and bored locks, minimum 5" by 10", or manufacturer's standard, 2-lock blocks for rim, mortise and vertical rod exit devices.
 - a) Provide 5" top rail for attachment of closers and bottom rail (heights as required) for attachment of vertical rod exit device bottom latch and automatic flush bolts.

3. PREFITTING AND PREPARATION FOR HARDWARE

- a. Pre-fit and pre-machine wood doors at factory, including beveling both edges 1/8" in 2". Where pairs of doors are scheduled, pre-fit and pre-machine as pairs.
 - 1) Where pairs of doors are scheduled with 3-point latching, lockset and flush bolts, the strike edge of the <u>inactive leaf</u> shall be square.
- b. Doors shall comply with tolerance requirements of NFPA 80 for pre-fitting.
- c. Machine doors for hardware requiring cutting of doors.
- d. Comply with final hardware schedules and door' frame shop drawings and with hardware templates and other essential information required to ensure proper fit of doors and hardware.
 - 1) <u>Top and Hinge Edges</u>: 1/8".
 - 2) <u>Single Door, Lock Edge</u>: 1/8".
 - 3) <u>Pair Meeting Edge</u>: 1/16" per leaf.
 - 4) <u>Bottom (rated or non-rated):</u>
 - a) 1/2" from decorative floor covering.
 - b) 3/4" maximum from top of non-combustible floor.
 - c) 3/8" maximum from top of non-combustible sill or threshold.
 - d) Doors with vertical rod exit devices, manual or automatic flush bolts shall be undercut for latching of bolts to a flush floor strike or threshold.
 - e) See Room Finish Schedule for floor finish materials.
- e. Coordinate with the metal frame supplier the locations of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in factory.
- f. Light openings and other detail work where shown shall be in accordance with manufacturer's standard detail or as detailed by the Architect.
- 4. DOOR FINISH
 - a. <u>General</u>:

- 1) Comply with applicable requirements of WDMA Standard for types of finish systems indicated.
- 2) Doors to receive paint finish shall be factory primed.
- b. Prefinished wood doors shall be finished at the factory using transparent conversion varnish AWI TR-4; WDMA #3 or transparent catalyzed polyurethane AWI TR-6; WDMA #5 System.
 - 1) Finish shall be Architect's choice of clear or manufacturer's standard finish stain.

C. EXECUTION

- 1. INSTALLATION
 - a. Section <u>06 20 23 FINISH CARPENTRY</u>, shall be responsible for unloading, protection, and storage of wood doors upon delivery to jobsite.
 - b. Section <u>06 20 23 FINISH CARPENTRY</u>, shall be responsible for wood door installation.
 - c. Section <u>09 91 00 PAINTING</u>, shall be responsible for finish paint on doors.

08 31 00 - ACCESS DOORS AND PANELS

A. GENERAL

1.

RELATED DOCUMENTS

- a. The provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73</u> <u>00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1</u> <u>GENERAL REQUIREMENTS</u> are included as a part of this section as though bound herein.
- 2. SCOPE
 - a. This section covers furnishing and installing all access panels as shown on the Drawings and/or required for a complete installation.

3. SUBMITTALS

- a. <u>Product Data</u>: Submit door manufacturer's product data, specifications, and installation instructions for each type of access panel.
 - 1) Include details of core and stile construction, trim for openings and similar components.
 - 2) Include certifications as may be required to show compliance with Specifications.
- b. <u>Shop Drawings</u>: Submit shop drawings indicating location and size of each access panel, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing, and other pertinent data.

4. QUALITY ASSURANCE

- a. Provide all access panels for the project by the same source and the same manufacturer.
- b. Obtain Architect's approval of sizes that may vary slightly from those indicated when they are not in accordance with manufacturer's standards.

5. DELIVERY, STORAGE AND HANDLING

- a. Package and ship in accordance with manufacturer's recommendations.
- b. Store in dry area out of direct sunlight.

B. PRODUCTS

- 1. <u>Manufacturer</u>: Products manufactured by William Brothers Corp. of America or Architect approval equal.
- 2. <u>Access Panels</u>:
 - a. <u>Type A</u>: Model WB-FR-6800 Series Fire Rated ceiling access door as manufactured by Williams Brothers of America.
 - 1) <u>Door Size</u>: 22" x 24".

- 2) <u>Door</u>: 16-gauge steel.
- 3) <u>Trim</u>: 16-gauge steel.
- 4) <u>Hinge</u>: Fully concealed, pivot rod type hinge.
- 5) Latch: Knurled knob lock with one (1) flush key.
- 6) <u>Finish</u>: Prime painted.
- 7) <u>Insulation</u>: 2" thick mineral wool between sheets of 22-gauge steel.

3. FABRICATION

- a. Manufacture each access panel assembly as an integral unit ready for installation.
- b. <u>Welded Construction:</u> Furnish with a sufficient quantity of 1/4" mounting holes to secure access panels to types of supports indicated.
- c. Furnish number of latches required to hold door in flush smooth pane when closed.

C. EXECUTION

- 1. EXAMINATION
 - a. Verify conditions are ideal for suitable installation.

2. PREPARATION

a. Advise installers of work relating to access panel installation including rough opening dimensions, locations of supports, and anchoring methods.
1) Coordinate delivery with other work to avoid delay.

3. INSTALLATION

- a. Follow manufacturer's instructions for installing access panels.
- b. Set frames to proper alignment with the wall or ceiling.
- c. Position access panels for proper access to concealed equipment requiring access.
- 4. ADJUST AND CLEAN
 - a. Adjust panel after installation for proper operation.
 - b. Remove and replace panels or frames that are warped, bowed, or damaged.

08 41 13 - ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1</u> <u>GENERAL REQUIREMENTS</u> specification sections, apply to work of this section.
 - b. See Section <u>08 13 16 ALUMINUM DOORS</u>.
 - 2. SUMMARY
 - a. Extent of aluminum entrances and storefront is indicated on drawings and schedules.
 - b. Aluminum entrances and storefront types required for the project include:
 - 1) Exterior storefront type framing
 - 2) Operable windows within the storefront system
 - 3) Glazing for the above

3. SYSTEM DESCRIPTION –EXTERIOR SYSTEMS

- a. <u>Performance Requirements</u>: Provide aluminum entrance and storefront assemblies that comply with the following performance characteristics:
 - 1) <u>Thermal Movement</u>: Provide systems capable of withstanding thermal movements resulting from a temperature range of 200° F.
 - 2) <u>Wind Loading</u>: Provide assemblies capable of withstanding a uniform test pressure of 30 psf inward and 20 psf outward when tested in accordance with ASTM E 330.
 - Air Infiltration Storefront: Provide framing system with an air infiltration rate of less than 0.05 CFM per sq. ft. of fixed area when tested in accordance with ASTM E 283 at an inward test pressure differential of 6.24 psf.
 - 4) <u>Water Penetration</u>: Provide framing system with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.
 - 5) <u>Condensation Resistance:</u> Exterior framing systems are "thermal-break" construction. Provide units tested for thermal performance in accordance with AAMA 1 502 showing condensation resistance factor (CRF) of not less than 50.
 - 6) <u>Thermal Transmittance:</u> Provide framing systems that have an overall Uvalue of not more than 0.4 BTU/(hr. x sq. ft. x degrees F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.
- 4. SUBMITTALS
 - a. <u>Product Data:</u> Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:
 - 1) Fabrication methods.
 - 2) Finishing.

- 3) Hardware.
- 4) Accessories.
- b. <u>Shop Drawings</u>: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:
 - 1) Elevations.
 - 2) Detail sections of typical composite members.
 - 3) Hardware, mounting heights.
 - 4) Anchorages and reinforcements.
 - 5) Expansion provisions.
 - 6) Glazing details.
- c. <u>Samples</u>: Submit pairs of samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets. Where color or texture variations are anticipated, include two (2) or more units in each set of samples indicating extreme limits of variations.
- d. <u>Certification</u>: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

5. QUALITY ASSURANCE

- a. <u>Single Source Responsibility</u>: Provide entrance and storefront produced by a single manufacturer capable of showing prior production of units similar to those required.
- b. <u>Installer's Qualifications</u>: Entrances and storefront shall be installed by a firm that has not less than 5 years successful experience in the installation of systems similar to those required.

6. PROJECT CONDITIONS

- a. <u>Field Measurements</u>:
 - 1) Field measure openings before fabrication to ensure proper fitting of work; show measurements on final shop drawings.
 - 2) Coordinate fabrication schedule with construction progress to avoid delay in the work.
 - 3) Where necessary, begin fabrication without field measurement; coordinate fabrication tolerances to ensure proper fit.

7. WARRANTY

- a. <u>Special Product Warranty</u>:
 - 1) Submit a written warranty, executed by the Contractor, Installer and Manufacturer, agreeing to repair or replace units (including re-glazing) which fail in materials or workmanship within 5 years from Substantial Completion of the building.
 - 2) Failures include, but are not necessarily limited to, structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes and other materials beyond normal weathering.
 - 3) This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Manufacturer</u>: Subject to compliance with all requirements, provide one of the following:
 - 1) EFCO
 - 2) Kawneer Company, Inc.
 - 3) Tubelite Div., Indal Inc.
 - 4) Vistawall Architectural Products.
 - 5) YKK AP America

2. MATERIALS – GENERAL REQUIREMENTS

- a. <u>Aluminum Members</u>: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- b. <u>Fasteners</u>: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
- c. <u>Reinforcement</u>: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- d. <u>Exposed Fasteners</u>:
 - 1) Except where unavoidable for application for hardware, do not use exposed fasteners.
 - 2) For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
- e. <u>Concealed Flashing</u>: Provide 26-gauge minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- f. <u>Brackets and Reinforcements</u>: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

3. SPECIFIC PRODUCT REQUIREMENTS

1)

- a. <u>Exterior Storefront System</u>:
 - Exterior Storefront System to be equal to:
 - a) Tubelite 14000 Series. 2" W x 4-1/2" D x .125" wall thickness.
- b. <u>Glazing</u>: Basis of Design: PPG Solarban 70 XL Other acceptable manufacturers, equivalent glazing systems by:
 - 1) Pilkington.
 - 2) Viracon.
 - 3) Guardian.

- c. Provide glass with strength required to withstand structural and thermal requirements listed in this section.
 - 1) Provide heat- strengthened glass generally.
 - 2) Use tempered glass on the inboard lite of all glass less than 30" above a finished floor (AFF).
 - 3) <u>Exterior Lite</u>: 1/4" tinted, tempered, SOLEXIA Glass, Solarban 70XL
 - 4) <u>Solar Control</u>: (Sputtered) on second surface (2).
 - 5) <u>Air Space</u>: 1/2"
 - 6) Interior Lite: 1/4" clear tempered glass.
 - 7) <u>Light Transmittance</u>:
 - a) Daylight: 56% Solar: 20% UV: 21%
 - b) Shading Coefficient: 0.37
 - c) Insulating (U)Value:
 - (i) Summer: 0.26
 - (ii) <u>Winter</u>: 0.28

5. COMPONENTS

- a. <u>Storefront Framing System</u>:
 - 1) Provide inside-outside matched resilient flush-glazed storefront framing system with provisions for glass replacement.
 - 2) Shop-fabricate and pre-assemble frame components where possible.
- b. <u>Aluminum Doors & Frames</u>: See Section <u>08 13 16 ALUMINUM DOORS</u>.

6. FABRICATION

- a. <u>General</u>: Sizes of units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- b. <u>Prefabrication</u>:
 - 1) Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible.
 - 2) Disassemble components only as necessary for shipment and installation.
- c. <u>Reinforcing</u>: Install additional aluminum and/or steel reinforcing as required for hardware, and as necessary for structural strength, sag resistance and rigidity.
- d. <u>Dissimilar Metals</u>: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- e. <u>Continuity</u>: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- f. <u>Uniformity of Finish</u>: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- 7. FINISHES
 - a. For All Exposed Metal:
 - 1) Anodized Aluminum

a) Color selected by the Architect from standard manufacturer's color range.

C. EXECUTION

1. INSTALLATION

- a. Comply with manufacturer's instructions and recommendations for installation.
- b. Set units plumb, level, and true to line, without warp or rack of framing members. Provide proper support and anchor securely in place.
- c. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
 - 1) Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101.
- d. Drill and tap frames and apply surface-mounted hardware items.
 - 1) Comply with hardware manufacturer's instructions and template requirements.
 - 2) Use concealed fasteners wherever possible.
- e. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weather tight construction.
 - 1) Comply with requirements of Division <u>7 THERMAL AND MOISTURE</u> <u>PROTECTION</u> for sealant, fillers, and gaskets.

2. ADJUSTING

a. Adjust operating hardware to function properly, for smooth operation without binding, and for weather tight closure.

3. CLEANING

- a. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- b. Clean glass surfaces after installation.
- c. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

4. PROTECTION

a. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

08 54 13 - FIBERGLASS FIXED WINDOWS AND AWNING

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> specification sections, apply to work of this section.
 - b. See Section 07 92 00 JOINT SEALANTS.
 - 2. REFERENCES
 - a. American Architectural Manufacturers Association (AAMA):
 - 1) AAMA 502 Voluntary Specification for Field Testing of Windows and Sliding Doors.
 - 2) AAMA 623 Voluntary Performance Requirements and Test Procedures for Organic Coatings on Fiber Reinforced Thermoset Profiles.
 - b. American Society for Testing and Materials (ASTM):
 - 1) ASTM C 1036 Flat Glass.
 - 2) ASTM C 1048 Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
 - ASTM E 283 Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
 - 4) ASTM E 547 Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
 - 5) ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - c. Window and Door Manufacturers Association (WDMA):
 - 1) ANSI/AAMA/NWWDA 101/I.S.2 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
 - 3. PERFORMANCE REQUIREMENTS
 - a. Windows shall meet a rating of LC–PG 50 specifications in accordance with ANSI/AAMA/NWWDA 101/I.S.2/A440-08.
 - b. <u>Window Air Leakage, ASTM E 283</u>: Window air leakage when tested at 1.57 psf (25 mph) shall be 0.05 cfm/ft² of frame or less.
 - c. <u>Window Water Penetration, ASTM E 547</u>: No water penetration through window when tested under static pressure of 7.5 psf (42 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.
 - 4. SUBMITTALS
 - a. Submit in accordance with Division 1 <u>GENERAL REQUIREMENTS</u>.

- b. <u>Product Data</u>: Submit manufacturer's product data, including installation instructions
- c. <u>Shop Drawings</u>: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.

5. QUALITY ASSURANCE

- a. <u>Mockup</u>:
 - 1) Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
 - 2) Approved mockup shall represent minimum quality required for the Work.
 - 3) Approved mockup shall remain in place within the Work.

6. DELIVERY, STORAGE AND HANDLING

- a. <u>Delivery</u>:
 - 1) Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name.
 - 2) Include installation instructions.
- b. Storage:
 - 1) Store materials in accordance with manufacturer's instructions.
 - 2) Store materials off ground and under cover.
 - 3) Protect materials from weather, direct sunlight, and construction activities.
- c. <u>Handling</u>: Protect materials and finish during handling and installation to prevent damage.

B. PRODUCTS

- 1. MANUFACTURER
 - a. <u>Basis of Design</u>:
 - 1) Pella Corporation, 102 Main Street, Pella, Iowa 50219. Toll Free (800) 54-PELLA. Phone (641) 621-1000. Website <u>www.pella.com</u>.

2. FIBERGLASS FIXED WINDOW AND AWNING

- a. <u>Fixed Windows and Awning</u>: Pella Impervia.
 - 1) Factory-assembled fiberglass windows with fixed unit over outward opening sash installed in frame.
 - 2) <u>Frame and Sash Material</u>: Duracast. 5-layer, pultruded-fiberglass material, reinforced with interlocking mat.
- b. <u>Frame</u>:
 - 1) <u>Type</u>: Integral Nail Fin.

- 2) <u>Interior and Exterior Frame</u>: Pultruded, fiberglass composite [with foam inserts].
- 3) <u>Overall Frame Depth</u>: 3-1/4 inches.
- 4) <u>Nominal Wall Thickness of Fiberglass Members</u>: 0.050 inch to 0.070 inch.
- 5) <u>Frame Corners</u>:
 - a) Mitered.
 - b) Joined and bonded with thermoset polyurethane adhesive, with corner lock.
- 6) <u>Jambs</u>: Contain factory-drilled installation screw holes.
- c. <u>Sash</u>:

1)

Sash Corners:

- a) Mitered.
- b) Bonded and sealed with injected thermoset polyurethane adhesive.
- d. <u>Glazing</u>:
 - 1) <u>Float Glass</u>: ASTM C 1036, Quality 1.
 - a) <u>Tempered Glass</u>: ASTM C 1048.
 - 2) <u>Type</u>: Polyurethane reactive (PUR) hot-melt glazed, 11/16-inch thick, insulating glass, clear [multi-layer Low-E coated with argon tempered.
- e. <u>Grilles</u>:
 - 1) <u>Insulating Glass</u>: Contain 3/4-inch, contoured, aluminum grilles between the glass.
 - 2) <u>Finish</u>: Factory-finished. Match window frame.
- f. Insect Screens:
 - 1) <u>Compliance</u>: ASTM D 3656 and SMA 1201.
 - 2) <u>Screen Cloth</u>: Black Vinyl-coated fiberglass, 18/16 mesh.
 - 3) Set in aluminum frame fitted to inside of window.
 - 4) Complete with necessary hardware.
 - 5) <u>Screen Frame Finish</u>: Baked enamel.
 - a) <u>Color</u>: As selected by Architect.

3. HARDWARE

- a. <u>Operator</u>:
 - 1) Steel worm-gear operator with hardened gears.
 - 2) <u>Operator Base</u>: Zinc die cast with painted finish.
 - 3) <u>Operator Linkage, Hinge Slide, and Hinge Arms</u>: 300 series stainless steel.
 - 4) <u>Exposed Fasteners</u>: Stainless steel.
 - 5) <u>External Hardware Salt Spray Exposure, ASTM B 117</u>: Exceed 1,000 hours.
- b. Crank Handle Finish:
 - 1) <u>Integrated Folding Crank</u>: Satin Nickel.
- c. <u>Locking System:</u> SureLock System.
 - 1) Single-handle locking system.
 - 2) Operate positive-acting arms that reach out and pull sash into locked position.

- d. <u>Awning Windows</u>: One installed on sash 27.5 inches and smaller in frame width, 2 unison operating locks installed on sash over 27.5 inches in frame width.
- e. <u>Lock Handle Finish</u>: Satin Nickel.

4. ROUGH OPENING SUPPORT BRACKETS

- a. Pella #51GH.
- b. Support brackets are required at each shim location (three (3) at each jamb and two (2) at sill).
- c. Install per manufacturer's instructions.
- d. Cover bracket with flashing tape.

5. TOLERANCES

- a. <u>Windows shall accommodate the following opening tolerances:</u>
 - 1) <u>Vertical Dimensions Between High and Low Points:</u> Plus 1/4", minus 0"
 - 2) <u>Width Dimensions</u>: Plus 1/4", minus 0".
 - 3) <u>Building Columns or Masonry Openings</u>: Plus or minus 1/4" from plumb.

6. FINISH

- a. <u>Exterior and Interior Duracast Finish</u>: Factory-applied powder-coat paint, comply with AAMA 623.
 - 1) <u>Color</u>: As selected by Architect from manufacturer's samples submitted by Contractor.
- 7. INSTALLATION ACCESSORIES
 - a. <u>Flashing/Sealant Tape</u>: Pella SmartFlash.
 - 1) Aluminum-foil-backed butyl window and door flashing tape.
 - 2) <u>Maximum Total Thickness</u>: 0.013".
 - 3) UV resistant.
 - 4) Verify sealant compatibility with sealant manufacturer.
 - b. <u>Interior Insulating-Foam Sealant</u>: Low-expansion, low-pressure polyurethane insulating window and door foam sealant.
 - c. <u>Exterior Perimeter Sealant</u>: "Pella Window and Door Installation Sealant" or equivalent high quality, multi-purpose sealant as specified in the joints sealant section.

C. EXECUTION

- 1. EXAMINATION
 - a. Examine areas to receive windows.

- b. Notify Architect of conditions that would adversely affect installation or subsequent use.
- c. Do not proceed with installation until unsatisfactory conditions are corrected.

2. INSTALLATION

- a. Install windows in accordance with manufacturer's instructions.
- b. Install windows to be weather-tight.
- c. Maintain alignment with adjacent work.
- d. Secure assembly to framed openings, plumb and square, without distortion.
- e. Integrate window system installation with exterior water-resistant barrier using flashing/sealant tape.
 - 1) Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's instructions.
- f. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating foam sealant.
- g. Install rough opening support brackets where window shims are used (three (3) each at jamb and two (2) at sill minimum).
 - 1) Cover with Flashing Tape.
- h. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

3. CLEANING

- a. Clean window frames and glass in accordance with Division 1 <u>GENERAL</u> <u>REQUIREMENTS</u>.
- b. Do not use harsh cleaning materials or methods that would damage finish or glass.
- c. Remove labels and visible markings.
- 4. PROTECTION
 - a. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

08 71 00 DOOR HARDWARE

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including Section <u>00 72 00</u> <u>GENERAL CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> Sections, apply to this Section.
 - b. See Section <u>08 11 13 HOLLOW METAL DOORS AND FRAMES</u>.
 - c. See Section <u>08 13 16 ALUMINUM DOORS</u>.
- 2. SUMMARY
 - a. This section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
 - b. <u>This section includes the following</u>:
 - 1) Hinges.
 - 2) Lock Cylinders and Keys.
 - 3) Lock and Latch Sets, Rim Devices
 - 4) Bolts.
 - 5) Push/Pull Units.
 - 6) Closers.
 - 7) Overhead Stops, Floor Stops, Wall Stops
 - 8) Kick Plates.
 - 9) Smoke Seals, Sound Seals
 - 10) Knox Box.
- 3. SUBMITTALS
 - a. <u>General</u>: Submit the following in accordance with Conditions of Contract and Division <u>1 GENERAL REQUIREMENTS</u> specification sections.
 - b. Product data including manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - c. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1) <u>Final Hardware Schedule Content</u>: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a) Type, style, function, size, and finish of each hardware item.
 - b) Name and manufacturer of each item.
 - c) Fastenings and other pertinent information.
 - d) Location of each hardware set cross- referenced to indications on Drawings both on floor plans and in door and frame schedule.

- e) Explanation of all abbreviations, symbols, and codes contained in schedule.
- f) Mounting locations for hardware.
- g) Door and frame sizes and materials.
- h) Keying information.
- d. <u>Submittal Sequence</u>:
 - 1) Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project Construction Schedule.
 - 2) Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
- e. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware.
 - 1) Check shop drawing of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

4. QUALITY ASSURANCE

- a. <u>Single Source Responsibility</u>: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.
- b. <u>Supplier Qualification</u>: A recognized architectural door hardware supplier, with warehousing facilities within fifty (50) miles of the job site that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
- c. <u>Fire-Rated Openings</u>: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction.
 - Provide only items of door hardware that are listed and are identical to project tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of door indicated in compliance with requirements of fire-rated door and door frame labels.

5. PRODUCT HANDLING

- a. Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.
- b. Packaging of door hardware is responsibility of supplier.
- c. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set number of approved hardware schedule. Two (2) or more identical sets may be packed in the same container.

- d. Inventory door hardware jointly with representative of hardware supplier and hardware installer until each is satisfied that count is correct.
- e. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- f. Provide secure lock-up for door hardware delivered to the Project, but not yet installed.
- g. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

6. MAINTENANCE

a. <u>Maintenance Tools and Instructions</u>: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. PRODUCTS

1. MANUFACTURERS

3)

- a. <u>Available Manufacturers</u>: subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to, the following: (Manufacturer whose name is prefixed with an asterisk *, indicates the manufacturer whose products are listed in the schedule at the end of this section.)
 - 1) <u>Butts and Hinges</u>:
 - a) *McKinney Products Co.
 - b) Hager
 - c) Stanley
 - 2) <u>Continuous Hinges</u>:
 - a) Pemko
 - b) Stanley
 - c) *Select
 - Lock and Latchsets
 - a) *Yale,
 - b) Corbin,
 - c) Schlage
 - 4) Wall & Floor Stops and Flush Bolts:
 - a) Glynn-Johnson Corp.
 - b) H.B.Ives Company
 - c) *Rockwood
 - 5) <u>Overhead Closers</u>:
 - a) LCN
 - b) Stanley
 - c) *Norton
 - 6) <u>Kick, Mop, and Armor Plates</u>:
 - a) * Rockwood Mfg
 - b) Burns
 - c) Trimco
 - 7) <u>Thresholds, Weatherstripping, Sweeps, Door Seals:</u>
 - a) *National Guard
 - b) Reese

- c) Pemko
- 8) <u>Exit Devices</u>:
 - a) Von Duprin
 - b) *Precision
 - c) Corbin, Yale, Sargent
- 9) <u>Overhead Stops</u>:
 - a) Glynn Johnson Corp.
 - b) *Architectural Builders' Hardware (ABH)
 - c) Sargent
- 10) <u>Lock Cylinders</u>:
 - a) Corbin
 - b) Schlage
 - c) Sargent
 - d) Best
 - Automatic Door Operators and Accessories:
 - a) LCN
 - b) Besam
 - c) *Automated
 - d) KM Products
- 12) High Security Key Lock Box:
 - a) Knox Box

2. SCHEDULED HARDWARE

11)

- a. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the Hardware Schedule at the end of this Section. Products are identified by using hardware designation numbers of the following:
 - 1) <u>Manufacturer's Product Designation</u>: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements.
 - a) Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.

3. MATERIALS AND FABRICATION

- a. <u>Manufacturer's Name Plate</u>: Do not use manufacturer's products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
 - 1) Manufacturer's identification will be permitted on rim of lock cylinders only.
- b. <u>Base Metals</u>: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware unit for finish designations indicated.
- c. <u>Fastener</u>: provide hardware manufactured to conform to published templated, generally prepared for machine screw installation.
 - 1) Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

- d. Furnish screws for installation with each hardware item.
 - 1) Provide Phillips flat-head screws except as otherwise indicated.
 - 2) Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including prepared for paint surfaces to receive painted finish.

4. HINGES, BUTTS AND PIVOTS

- a. <u>Templates</u>: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- b. <u>Screws</u>: Provide Phillips flat-head screws complying with the following requirements:
 - 1) For metal doors and frames install machine screws into drilled and tapped holes.
 - 2) For wood doors and frames install wood screws.
 - 3) For fire-rated wood doors install #12 x 1-1/4" threaded-to-the-head steel wood screws.
 - 4) Finish screw heads to match surface of hinges or pivots
- c. <u>Hinge Pins</u>: Except as otherwise indicated, provide hinge pins as follows:
 - 1) <u>Out-Swing Exterior Doors</u>: Nonremovable pins.
 - 2) <u>Interior Doors</u>: Non-rising pins.
 - 3) <u>Tips</u>: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.
- <u>Number of Hinges</u>: Provide number of hinges indicated but not less than three
 (3) hinges per door leaf for doors 90" or less in height and one (1) additional hinge for each 30" of additional height.
 - 1) <u>Fire-Rated Doors</u>: Not less than three (3) hinges per door leaf for doors 86" or less in height with same rule for additional hinges.

5. LOCK CYLINDERS AND KEYING

- a. <u>Existing System</u>: Grandmaster key into the existing Sargent keying system.
- b. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), keyed into the existing system.
- c. Equip locks with manufacturer's standard 7-pin removable core cylinders.
- d. <u>Metals</u>: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
- e. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
 - 1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
- f. <u>Key Material</u>: Provide keys of nickel silver only.
- g. Key Quantity: Furnish the following:
- 1) Two (2) change keys for each lock
- 2) Five (5) master keys for each master system
- 3) Five (5) grandmaster keys for each grandmaster system.
- h. Deliver keys to Owner.

6. EXIT DEVICES

- a. <u>Touch Pad Style</u>:
 - 1) Exit devices shall be touchpad style, fabricated of brass or bronze, stainless-steel or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
 - 2) All exit devices shall incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with the exit device operation.
 - a) Touch pad shall extend a minimum of one half of the door width.
 - b) All latch bolts to be dead latching type, with a self-lubricating coating to reduce wear.
 - 3) Endcap will be sloped to defect any impact from carts, and they shall be flush with the external mechanism case.
 - a) Endcaps that overlap and project above the mechanism case are unacceptable.
 - b) Endcap shall utilize a two-point attachment to the mounting bracket.
 - 4) Touch pad shall match exit device finish and shall be stainless steel for US26. US26D, US28, US32 and US32D finishes.
 - a) Only compression springs will be used in devices , latches and outside trims of controls.
 - b) Plastic templates shall be included with each device to facilitate a quick, easy and accurate installation.
 - 5) Strikes shall be roller type and come complete with a locking plate to prevent movement.
 - 6) All rim and vertical rod exit devices shall have passed a 5 million (5,000,000) cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
 - 7) All mortise exit devices shall have passed a 10 million (10,000,000) cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
 - 8) Provide cylinder dogging on panic exit hardware where noted in hardware sets.
 - 9) Exit devices shall be UL panic exit hardware.
 - a) All exit devices for fire-rated openings shall be UL labeled fire exit hardware.
 - 10) Lever trim for exit devices shall be vandal-resistant type, which will travel to a 90-degree down position when more than 35 lbs. of torque are applied, and which can easily be reset.
 - 11) <u>Manufacturers:</u>
 - a) Von Duprin; an Allegion Company, 99 Series (VON).
 - b) Precision; a Stanley Black and Decker Company, Apex Series (PRE).
 - 12) <u>Trim</u>:
 - a) As specified in sets.
 - b) Levers to match lockset design where specified.
- 7. LOCKS, LATCHES AND BOLTS

- a. <u>Strikes</u>: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
 - 1) Provide flat lip strikes for locks with 3-piece, antifriction latch bolts as recommended by manufacturer.
 - 2) Provide extra-long strike lips for locks used on frames with applied wood casing trim.
 - 3) Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
- b. <u>Lock Throw</u>: Provide 5/8" minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
 - 1) Provide 1/2" minimum throw of latch for other bored and pre-assembled types of locks and 3/4" minimum throw of latch for mortise locks.
 - 2) Provide 1" minimum throw for all dead bolts.
- c. <u>Flush Bolt Heads</u>: Minimum of 1/2" diameter rods of brass, bronze, or stainless steel with minimum 12" long rod for doors up to 84" in heights.
 - 1) Provide longer rods as necessary for doors exceeding 84" in height.
- d. <u>Exit Device Dogging</u>: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the unit with keyed dogging device to keep the latch bolt retracted, when engaged.

8. PUSH/PULL UNITS

- a. <u>Exposed Fasteners</u>: Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.
- b. <u>Concealed Fasteners</u>: Provide manufacturer's special concealed fastener system for installation, thru-bolted for matched pairs but not for single units.

9. CLOSERS AND DOOR CONTROL DEVICES

- a. <u>Size of Units</u>: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
- b. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
- c. Provide parallel arms for all overhead closers, except as otherwise indicated.
- d. <u>Access-Free Manual Closers</u>: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
- e. <u>Combination Door Closers and Holders</u>: Provide units designed to hold door in open position under normal usage and to release and close door automatically under fire

10. PROTECTION PLATES

a. <u>Kick Plates:</u>

- Furnish beveled on 4 edges, countersink fasteners; .050" thick x 8" high x 1 1/2" less door width for the push side on single doors and 1" less door width for the push side of pairs.
 - a) Adjust width on pairs accordingly for other conflicting hardware (astragals, mullions, etc.)

11. HARDWARE FINISHES

- a. Match items to the manufacturer's standard color and texture finish for the latch and locksets (for push-pull units if no latch or lock sets).
- b. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- c. The general hardware finish is to be US 4 606 Satin Brass, unless otherwise noted.

12 KNOX BOX

- a. Provide Knox Box, Model 3200 as manufactured by Knox Company, Irvington, CA.
- b. Locate box where shown on drawings.

C. EXECUTION

- 1. INSTALLATION
 - a. Mount hardware units at heights indicated in following applicable publication, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
 - 1) "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 - b. Install each hardware item in compliance with the manufacturer's instructions and recommendations.
 - 1) 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 FINISHES.
 - 2) Do not install surface mounted items until finishes have been completed on the substrates involved.
 - c. Set units level, plumb, and true to line and location.
 - 1) Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - d. Drill and countersink units that are not factory prepared for anchorage fasteners.
 1) Space fasteners and anchors in accordance with industry standards.
 - e. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Section <u>07 92 00</u> <u>JOINT SEALANTS</u>.

f. <u>Weatherstripping and Seals</u>: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

2. ADJUSTING , CLEANING AND DEMONSTRATING

- a. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit.
- b. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- c. Clean adjacent surfaces soiled by hardware installation.
- d. Instruct Owner's personnel in proper adjustment and maintenance of door hardware and hardware finishes.

Set #1		110 B				
Qty.	Item		Item #	Mfr.	Finish	Notes
2	Cont. Hinge		SL-11 HD	Select	CLR.	
2	Push Bar		620B	Yale	630	
1	Mullion		SL-60K	Special-Lite	628	
1	Mortise Cyl.		A620-1161L	Yale	626	
1	Closer		7500	Norton	689	
1	Auto-Operator		4100LE	Horton	689	
2	Actuators		59-H	Horton	630	
Set #2		110A				
Qty.	Item		Item #	Mfr.	Finish	Notes
2	Cont. Hinge		SL-11 HD	Select	CLR.	
						Activ
1	Rim Exit		2100F-AU626F-A640	Yale	630	е
4			24005 446205	M-L.	620	Inacti
1	Rim Exit		2100F-AU629F	Yale	630	ve
1	Mullion		SL-60K	Special-Lite	628	
1	Mortise Cyl.		A620-1161L	Yale	626	
1	Closer		7500	Norton	689	
1	Auto-Operator		4100LE	Horton	689	
2	Actuators		59-H	Horton	630	
1	Electric Strike		9600	HES	630	
1	Power Supply		BPS-24-2	Securitron		
1	Threshold		425E	NGP	Alum.	
						Seals by
						door
2	Sweep		199NA	NGP	Alum.	mfr.

Set #3		115-116				
Qty.	Item		Item #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
1	Passage Lever		AU-4601LN	Yale	626	
1	Closer		8501	Norton	689	
1	Wall Stop		409	Rockwood	630	
Set #4		106-107				
Qty.	Item		Item #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
1	Privacy Lever		AU-4602LN	Yale	626	
1	Wall Stop		409	Rockwood	630	
Set #5		117A-117B				
Qty	Item		ltem #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
1	Storeroom Lever		B-AU-4605LN-A600	Yale	626	
1	Wall Stop		409	Rockwood	630	
Set #6		108-109-111				
Set #6 Qty	ltem	108-109-111	Item #	Mfr.	Finish	Notes
Set #6 Qty 3	ltem Hinge	108-109-111	ltem # TA2714	Mfr. McKinney	Finish 652	Notes
Set #6 Qty 3 1	ltem Hinge Office Lever	108-109-111	ltem # TA2714 B-AU-4607LN-A600	Mfr. McKinney Yale	Finish 652 626	Notes
Set #6 Qty 3 1 1	Item Hinge Office Lever Wall Stop	108-109-111	ltem # TA2714 B-AU-4607LN-A600 409	Mfr. McKinney Yale Rockwood	Finish 652 626 630	Notes
Set #6 Qty 3 1 1	Item Hinge Office Lever Wall Stop	108-109-111	ltem # TA2714 B-AU-4607LN-A600 409	Mfr. McKinney Yale Rockwood	Finish 652 626 630	Notes
Set #6 Qty 3 1 1 Set #7	Item Hinge Office Lever Wall Stop	108-109-111 205-206	Item # TA2714 B-AU-4607LN-A600 409	Mfr. McKinney Yale Rockwood	Finish 652 626 630	Notes
Set #6 Qty 3 1 1 5et #7 Qty	Item Hinge Office Lever Wall Stop	108-109-111 205-206	Item # TA2714 B-AU-4607LN-A600 409 Item #	Mfr. McKinney Yale Rockwood Mfr.	Finish 652 626 630 Finish	Notes
Set #6 Qty 3 1 1 Set #7 Qty 6	Item Hinge Office Lever Wall Stop Item Hinge	108-109-111 205-206	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714	Mfr. McKinney Yale Rockwood Mfr. McKinney	Finish 652 626 630 Finish 652	Notes
Set #6 Qty 3 1 1 Set #7 Qty 6 1	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever	108-109-111 205-206	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale	Finish 652 626 630 Finish 652 626	Notes
Set #6 Qty 3 1 5et #7 Qty 6 1 2	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts	108-109-111 205-206	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood	Finish 652 626 630 Finish 652 626 626	Notes
Set #6 Qty 3 1 1 Set #7 Qty 6 1 2 Set #8	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts	108-109-111 205-206 112, 114,211	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood	Finish 652 626 630 Finish 652 626 626	Notes
Set #6 Qty 3 1 Set #7 Qty 6 1 2 Set #8 Qty	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts	108-109-111 205-206 112, 114,211	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood	Finish 652 626 630 Finish 652 626 626 626 Finish	Notes Notes
Set #6 Qty 3 1 Set #7 Qty 6 1 2 Set #8 Qty 3	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts Item Hinge	108-109-111 205-206 112, 114,211	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood Mfr. McKinney	Finish 652 626 630 Finish 652 626 626 626 Finish 652	Notes Notes Notes
Set #6 Qty 3 1 Set #7 Qty 6 1 2 Set #8 Qty 3 1	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts Item Hinge Storeroom Lever	108-109-111 205-206 112, 114,211	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555 Item # TA2714 B-AU-4605LN-A600	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood Mfr. McKinney Yale	Finish 652 626 630 Finish 652 626 626 626 Finish 652 626	Notes Notes Notes
Set #6 Qty 3 1 Set #7 Qty 6 1 2 Set #8 Qty 3 1 1 1 1 1 1 1 1 1 1 1 1 1	Item Hinge Office Lever Wall Stop Item Hinge Storeroom Lever Flushbolts Item Hinge Storeroom Lever Closer	108-109-111 205-206 112, 114,211	Item # TA2714 B-AU-4607LN-A600 409 Item # TA2714 B-AU-4605LN-A600 555 Item # TA2714 B-AU-4605LN-A600 8501	Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Rockwood Mfr. McKinney Yale Norton	Finish 652 626 630 Finish 652 626 626 626 Finish 652 626 626 626 626 626 629	Notes Notes Notes

Set #9		ST1-A ST1-C	ST2-A ST2-C			
Qty	Item		ltem #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
						Passage
1	Rim Exit		2100F-628F	Yale	630	Trim
1	Closer		8501	Norton	689	
1	Wall Stop		409	Rockwood	630	
Set		100A 100 D (
#10	14	100A-100-B-3	511-B-512-B	D. 4.E.,	Finish	Natas
Qty	Item		Item #	Mitr.	Finish	Notes
3	Hinge		1A2/14-NRP	Mickinney	652	
1	Rim Exit		2100F-E0	Yale	630	
1	Closer		/500	Norton	689	
1	Threshold		425E	NGP	Alum.	
1	Weatherseal		160V	NGP	Alum.	
1	Sweep		199NA	NGP	Alum.	
Set						
#11		116				
Qty	Item		ltem #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
1	Rim Exit		7100-L8	Yale	626	
1	Closer		8501	Norton	689	
1	Kickplate		K1050	Rockwood	626	
Set						
#12		Unit Entry				
Qty	Item		ltem #	Mfr.	Finish	Notes
1	Hinge		TA2714	McKinney	652	
2	Spring Hinge		1502	McKinney	652	
	Entry Lever					
1	w/DB		InSync I-Troy	Kaba	626	
1	Wall Stop		474	Rockwood	626	
1	Viewer		622	Rockwood	626	
Set						
#13		Bathroom &	Bedroom			
Qty	Item		ltem #	Mfr.	Finish	Notes
3	Hinge		TA2714	McKinney	652	
1	Privacy Lever		AU-4602LN	Yale	626	
1	Wall Stop		409	Rockwood	626	

Set					
#14		Unit Storage			
Qty	ltem	ltem #	Mfr.	Finish	Notes
3	Hinge	TA2714	McKinney	652	
1	Passage Lever	AU-4601LN	Yale	626	

All hinges to be ball bearing All locks to be Grade 2 commercial with SFIC All exits to be Grade 1 HD closers for exterior - Medium duty for interior

09 21 16 - GYPSUM DRYWALL ASSEMBLIES

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Refer to Section <u>06 10 00 ROUGH CARPENTRY</u>.
- 2. SCOPE
 - a. This section covers furnishing all labor, materials, tools and equipment required to install all gypsum wallboard, metal corner beads, trims and expansion joints as well as shown on the drawings, as herein specified and/or as required for a complete job.
 - b. Contractor shall correct <u>all</u> poorly installed drywall including, but not limited to, poor seams, "nail pops", poorly executed patches, etc.
 - c. Final wallboard condition shall be like new and ready to receive paint.
 - d. <u>Cold Weather Requirements</u>:
 - For the day before thru the day after the period of laminating and of finishing of wallboard joints if outside temperatures will be less than 55°, maintain the temperature within the building within the range of 55° to 70° F.
 - 2) Adequate ventilation shall also be provided to eliminate excessive moisture within the building during this same period.
 - e. <u>Delivery of Materials</u>: All materials, as specified, shall be delivered to the job in their original unopened containers or bundles, stored in a place providing protection from damage and exposure to the elements.
 - f. <u>Subsurface</u>: Examine and inspect materials to which gypsum board is to be applied.
 - 1) Remedy all defects prior to installation of Gypsum board.

B. MATERIALS

- 1. GENERAL
 - a. For convenience and as a method of establishing the quality desired, trade names of the United States Gypsum Company have been used.
 - 1) Products meeting these specifications will be allowed as manufactured by:
 - a) Georgia-Pacific
 - b) Gold Bond Building Products Division
 - c) National Gypsum Co.
 - d) Domtar
 - e) Architect approved equal.
 - b. Gypsum wallboard shall conform to ASTM C36 "Specification for Gypsum Wallboard" with Type "X" specification added for Fire Code "C" and ASTM C-630 "Specification for Water Resistant Wallboard for "W/R".

- c. <u>Gypsum Wallboard at Interior Partitions</u>: Shall be 5/8" Sheetrock SW, located as indicated on the drawings or specified herein.
- d. <u>Gypsum Wallboard at all Fire Rated Partitions, Walls and Ceilings</u>: Shall be 5/8" Sheetrock Firecode "C", located as indicated on the drawings or specified herein.
- e. <u>Gypsum Wallboard at all Bathroom Tub/Shower Walls (three (3) Sides,</u> <u>approximately 32" x 60" x 32")</u>: Shall be 1/2" or 5/8" Sheetrock W/R, located as indicated on the drawings or specified herein.
- f. <u>Corner Beads and Vinyl or Metal Trim</u>: Shall be Dur-A-Bead 101 or 200A or vinyl profile indication as appropriate.
 - 1) Corner reinforcement for adhesive attachment shall be Perf-A-Bead Reinforcement.
- g. <u>Joint Treatment Material</u>: USG "Durabond 90" Joint Compound and USG Ready Mixed All Purpose Joint Compound.
- h. <u>Resilient Channels</u>: Provide RC-1 resilient channels located as noted on the drawings.
- i. <u>Textured Finish Materials for Ceilings and Walls</u>: U.S.G. multi-purpose texture. Provide site-sprayed samples to determine thickness.
- j. <u>Sound Attenuation Insulation</u>: Unfaced mineral fiber blanket insulation produced by combining glass fibers with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane where facing). Use 3-1/2" thick batt, unless otherwise noted.

C. APPLICATIONS

- 1. GYPSUM WALLBOARD
 - a. The installation and application of all USG materials shall be in accordance with the latest printed directions or specifications of United States Gypsum and as follows:
 - b. <u>Gypsum Wallboard</u>: All ends and edges of Sheetrock Gypsum Wallboard shall occur over fastening members, except when joints are at right angles to framing members as in horizontal application.
 - 1) Ceiling wallboard shall be attached to framing supports utilizing both glue and screw fastening.
 - c. Sheetrock Gypsum Wallboard shall be applied to minimize end joints.
 - d. Boards shall be brought into contact but shall not be forced into place.
 - e. Where ends or edges abut, they shall be neatly fitted.
 - f. End joints shall be staggered.
 - g. Joints on opposite sides of a partition shall be so arranged as to occur on different studs.

- h. Wallboard shall be attached to framing supports by Architect approved method.
 - 1) Fasteners shall provide a slight depression below the surface of the wallboard without breaking the face paper and fasteners shall not be driven closer than 3/8" from edges and ends of the board.
 - 2) While the fasteners are being driven, the wallboard shall be held in firm contact with the underlying support.
 - 3) Attachment should proceed from the center of the wallboard towards ends and edges.
- i. When necessary to cut ends, edges, scribe or make cutouts within the field of the wallboard, it shall be done in a workmanlike manner.
- j. Metal corner beads shall be securely attached as per manufacturer's recommendations, to all external corners and in single lengths.
 - 1) Clinch and nail corner beads securely.
- k. Metal or vinyl trim shall be installed where drywall abuts exposed dissimilar wall material in the manner recommended by the manufacturer.
 - 1) Such an abutment exists at window return.
 - 2) In this instance, vinyl "J-channel" must be applied to drywall edge abutting window to prevent moisture causing deterioration.
- I. <u>Special Note</u>: The Sheetrock SW System (Board and Joint Treatment) was tested and designed to function as a unit.
 - 1) Substitution for one and not all of the procedures and/or products in this specification is not recommended.
- 2. JOINT TREATMENT
 - a. Unless otherwise indicated, all walls, partitions and ceilings are included.
 - b. Joints of exterior gypsum wallboard, where not exposed to view, shall not be treated, but shall be installed butted tightly.
- 3. APPLICATION PRE-FILL
 - a. <u>Mixing</u>: Durabond "90" joint compound shall be mixed according to the directions on the bag.
 - 1) Caution shall be used to prevent over mixing, use of extremely cold water and compound.
 - b. All V-grooves formed by abutting wrapped eased edges of Sheetrock SW shall be pre-filled with Durabond "90" joint compound.
 - 1) Application shall be with a flexible 5" or 6" joint finishing knife or an Ames Pre-Fill tool.
 - 2) The V shall be filled flush with the plane of the taper depression and any excess compound beyond the groove shall be wiped clean, leaving a clear depression to receive tape.
 - 3) The pre-fill shall have hardened prior to the next application.
- 4. APPLICATION JOINT TREATMENT
 - a. <u>Taping or Embedding</u>:
 - 1) USG Ready Mixed Joint Compound All Purpose, shall be applied with

a suitable tool in a thin uniform layer to all joints and angles to be reinforced.

- 2) Perf-A-Tape reinforcement shall be applied immediately and centered over the joint and seated into the compound.
- 3) Sufficient compound must remain under the tape to provide proper bond.
- 4) A skim coat shall immediately follow tape embedment but not to function as a fill or a second coat.
- 5) Tape shall be properly folded and embedded in all angles to provide a true angle.
- 6) The tape or embedding coat must be thoroughly dry prior to application of the fill coat.
- 7) <u>Filling</u>: USG Ready Mixed Compound
 - a) All Purpose, shall be applied over the embedding coat, filling the board taper flush with the surface.
 - b) On joints with no taper, the fill coat shall cover the tape and feather out at least 4" on either side of the tape.
 - c) No fill coat is necessary at interior angles.
- 8) The fill coat shall be thoroughly dry prior to application of the finish coat.
- 9) <u>Finishing</u>: USG Ready Mixed Joint Compound
 - a) All-Purpose, shall be spread evenly over and extended slightly beyond the fill coat on all joints and feathered to a smooth uniform finish.
 - b) On tapered joints, the finish coat shall not protrude beyond the plane of the surface.
- 10) All taped angles shall receive a finish coat to cover the tape and taping compound, providing a true angle.
 - a) Where necessary, sanding shall occur between coats and following the final application of compound to provide a smooth surface ready for decoration.
- 11) <u>Filling and Finishing of Fasteners Depressions</u>:
 - a) A taping or all-purpose compound must be applied as the first coat to all fastener depressions.
 - b) This shall be followed by a minimum of two (2) additional coats of all-purpose compound, leaving all depressions level with the plane of the surface.

5. RESILIENT CHANNELS

- a. Install resilient channels at 24" C/C maximum or closer, as shown on the drawings.
 - 1) Locate joints as recommended by manufacturer.
- 6. TEXTURE FINISH
 - a. Apply texture finish to all gypsum board ceilings at apartments.
 - b. At community buildings, refer to finish schedule on the drawings.
 - c. Install texture material utilizing brush, roller, spray application, stipple brush or other application method approved by Architect.
 - d. Walls in closets, mechanical rooms and linens <u>only</u> may receive "knock-down", "stipple" or smooth texture.

- e. All other walls to receive smooth finish.
- f. Texture product may <u>NOT</u> be tinted with pigment or paint material.

D. REPAIRS

- 1. GENERAL
 - a. Contractor shall correct all poorly installed drywall including, but not limited to, poor seams, "nail pops", poorly executed patches, etc.
 - b. Final drywall condition shall be like new and ready to receive new paint finish.

09 51 00 - ACOUSTICAL CEILINGS

- A. GENERAL
 - 1. SUMMARY
 - a. This Section includes:
 - 1) Acoustical Tile Ceiling Panels.
 - 2) Suspension Systems.
 - 3) Trim and Accessory Pieces.
 - 2. SUBMITTALS
 - a. <u>Samples</u>: Provide full-size sample of each tile and 12" long sample of suspension member.
 - 3. QUALITY ASSURANCE
 - a. <u>Installer Qualifications:</u> Engage an experienced Installer who has successfully completed acoustical ceilings similar in material, design, and extent to that indicated for Project.
 - b. <u>Coordination of Work</u>: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, firesuppression system components, and partition system.
 - 4. DELIVERY, STORAGE AND HANDLING
 - a. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
 - 5. PROJECT CONDITIONS
 - a. <u>Space Enclosure</u>: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity recommended by manufacturer can be continuously maintained.
 - 6. SUBSTITUTIONS
 - a. Section <u>01 60 00 PRODUCT REQUIREMENTS</u> contains the procedures for submitting and obtaining review of products which, in addition to those specified, may be approved for use in the project.
 - 7. EXTRA MATERIALS
 - a. <u>Deliver Extra Materials to Owner</u>: Furnish two (2) unopened boxes of each tile used on the project.

B. PRODUCTS

1. ACOUSTICAL TILE CEILING SYSTEMS

HOPE AVENUE HOMES

- a. <u>Basis of Design Product:</u> Provide ULTIMA Item No.1913 as manufactured by Armstrong.
- b. Subject to compliance with requirements, products manufactured by one of the following manufacturers is acceptable:
 - 1) USG Corporation
 - 2) Armstrong World Products, Inc.
 - 3) Certainteed Corp.
- c. <u>Acoustical Tile Ceiling (ATC-1)</u>:
 - 1) <u>Classification</u>: Provide tile complying with ASTM E1264 for type, form and pattern as follows:
 - a) <u>Type and Form</u>: Type IV, Form 2, Pattern E; Fire Class A
 - b) <u>Pattern</u>: Fine Texture
 - (i) <u>Color</u>: White
 - (ii) <u>LR</u>: Not less than 0.90
 - (iii) <u>NRC</u>: Not less than 0.75
 - (iv) <u>CAC</u>: not less than 35
 - (v) Edge Detail: Square Lay-in in standard 15/16" grid
 - (vi) <u>Thickness</u>: 3/4"
 - (vii) Modular Size: 24" x 48"
- 2. SUSPENSION SYSTEMS
 - a. Provide compatible suspension system for specified acoustical ceiling tiles. Provide all necessary trim, accessories, hangers, carrying angles, etc. to provide a complete installation under the structural members shown.
 - <u>Basic Grid Suspension System for Interior Ceilings</u>: ASTM C 645, system shall be intermediate-duty, hot-dipped galvanized steel with 1- 1/2" deep x 1" (nominal) wide exposed tee grid. System shall be equal in general design and characteristics to manufacturer's standard direct –hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.
 - 2) <u>Color</u>: White, to match ceiling panels.
 - b. <u>Manufacturers</u>: Subject to compliance with requirements, provide products by one of the following:
 - 1) Armstrong World Industries, Inc. (15/16" Prelude)
 - 2) USG Interiors, Inc.
 - 3) Chicago Metallic
 - c. <u>Wire for Hangers and Ties</u>: ASTM A 641, Class 1 zinc coating, soft temper. Minimum 12-gauge.
 - d. <u>Edge Moldings and Trim</u>: Provide manufacturer's standard molding for edges and penetrations of ceiling that fits with the type of edge detail and suspension system indicated or required.
 - e. <u>Hold-Down Clips</u>: Furnish and install at all suspended ceiling tile located in vestibules.
- C. EXECUTION
 - 1. EXAMINATION

a. Examine substrates and structural framing to which ceiling system attaches or abuts, for conditions, which could adversely affect the installation.

2. PREPARATION

- a. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling.
- b. Avoid use of less-than-half-width units at borders.

3. CEILING INSTALLATION

- a. <u>General</u>: Install acoustical ceiling systems to comply with installation standard below per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
- b. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system.
- c. Provide supplemental framing where required.
- d. Secure wire hangers by looping and wire-tying, either directly to structures in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
- e. Do not support ceiling from ductwork.
- f. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
- g. Install adhesively applied ceiling tile to substrate with adhesive manufactured for this purpose and according to the adhesive and tile manufacturer's instructions. Install splines in joints between tiles and level.
 - 1) Butt tile together in a way to minimize visibility of joints.
- 4. CLEANING
 - a. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members.
 - b. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
 - c. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

09 65 00 - RESILIENT FLOORING

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. The provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73 00</u> <u>SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1 GENERAL</u> <u>REQUIREMETNTS</u> are included as a part of this section as though bound herein
 - b. See Section <u>09 68 00 CARPETING</u>.
 - 2. SCOPE
 - a. This section covers furnishing all labor materials tools and equipment required to install all sheet vinyl flooring and base as shown on the Drawings, and as herein specified, and/or as required for a complete job.
 - 3. SYSTEM DESCRIPTION
 - <u>Accessibility Requirements</u>: Floor surfaces shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this section.
 1) Recommended 0.6 static coefficient of friction.
 - 4. SUBMITTALS
 - a. Product data for each type of product specified.
 - b. Submit one full set of up-to-date, actual samples, showing colors and patterns available for each type of material required, immediately after award of Contract.
 - 1) Include two (2) lithograph brochures with colors and patterns for Architect's use in making color selections.
 - c. <u>Certification</u>:
 - 1) <u>Fire Test Performance</u>: Submit manufacturer's certification that resilient tile flooring furnished for areas indicated complies with required fire test performance and has been tested and meets indicated requirements.
 - <u>V.O.C. Compliance</u>: Submit certification by tile manufacturer that products supplied for tile installation comply with local regulations controlling use of volatile organic compounds (V.O.C.'s).
 - a) V.O.C. content shall be limited to 50 gm/liter or less.
 - d. Maintenance Data for resilient floor tile, to include the Operating and Maintenance Manual specified in Division <u>1 GENERAL REQUIREMENTS</u>.
 - 5. QUALITY ASSURANCE
 - a. <u>Fire Test Performance</u>: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.
 - 1) ASTM E648 (Critical Radiant Flux) of 0.45 watts per sq.cm. or greater, Class I.
 - 2) ASTM E662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
 - 6. DELIVERY, STORAGE AND HANDLING
 - a. Deliver to jobsite in unopened containers with manufacturer's product name, pattern, and color clearly printed thereon.

- b. Store flooring in dry spaces with ambient temperature maintained at 65° F minimum.
- c. Store flooring on flat surfaces.
- d. Move flooring and installation accessories into spaces where they will be installed fortyeight (48) hours in advance of installation.

7. PROJECT CONDITIONS

- a. Maintain minimum temperature of 65° F in spaces to receive resilient flooring for at least forty-eight (48) hours prior to installation, during installation, and for not less than forty-eight (48) hours after installation.
- b. Store resilient flooring materials in spaces where they will be installed for at least fortyeight (48) hours before beginning installation.
- c. Subsequently, maintain minimum temperature of 55° F in areas where work is completed.

8. SEQUENCING AND SCHEDULING

- a. Install flooring and accessories after other finishing operations, including painting, have been completed.
- b. Do not install flooring over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

9. EXTRA MATERIALS

- a. Furnish to the Owner prior to final acceptance, extra stock consisting of 2% of the total quantity but not less than two (2) full cartons/rolls of each color and pattern installed on the job.
- b. Properly package, seal, and identify extra stock materials.

B. PRODUCTS

- 1. RESILIENT FLOORING
 - a. Basis of Design shall be Johnsonite (Tarkett) unless noted otherwise.
 - b. All resilient flooring shall be Scientific Certification Systems (SCS) certified.

c. <u>Sheet Vinyl Flooring (SVF)</u>:

- 1) SVF-1 (Common Areas, Apartment Unit Bathrooms):
 - a) Johnsonite "Melodia" vinyl sheet roll flooring
 - b) Color to be as selected by Architect; up to four (4) colors.
- d. <u>Vinyl Composite Tile (VCT)</u>:
 - VCT-1 (Storage Rooms, Utility Rooms:
 - a) Johnsonite "Azrock" vinyl composition tile
 - b) Color to be selected by Architect; up to four (4) colors.
- e. <u>Vinyl Plank (VP)</u>:

1)

1) VP-1 (Apartment Units):

- a) Mohawk Group "Grainiac" C0013 resilient tile floor plank
- b) 6" x 48"
- c) Color to be selected by Architect.

2. RESILIENT BASE

- a. <u>Vinyl Cove Base (VB-1)</u>: Johnsonite (Tarkett) wall base' 4" height, 1/8" traditional; up to two (2) colors as selected by Architect.
 - 1) <u>Style</u>: Cove with top-set toe, unless otherwise noted.
 - 2) <u>Exterior Corners</u>: Premolded by 4" in length each way.
 - a) Pre-molded corners less than 4" in length each way are not acceptable.
 - 3) <u>Interior Corners</u>: Formed on job.
 - 4) <u>Ends</u>: Premolded.

3. MISCELLANEOUS ACCESSORIES

- a. <u>Vinyl Stair Treads and Risers</u>:
 - 1) Johnsonite (Tarkett)Safe-T-Grip Square Nose Visually Impaired (VIVG)
 - 2) 12" tread depth with 7" integral riser
 - 3) 2" wide safety grit tape insert
 - 4) Up to two (2) colors as selected by Architect.
- b. Edge Reducing Strips:
 - 1) Beveled 1" to 1-1/2" wide by 1/8" thick of vinyl or rubber
 - 2) Same manufacturer as flooring
 - 3) Colors as selected by Architect.
 - 4) Use where meeting unfinished floor or flooring of different material.
- c. <u>Transition Strips</u>: Shall be as indicated on the Drawings.
- d. <u>Adhesive</u>: Low VOC, water-resistant type recommended by floor covering manufacturer to suit resilient flooring products and substrate conditions indicated.
- e. <u>Trowelable Underlayments and Patching Compounds</u>: Latex-modified, Portland cement based formulation provided or approved by floor covering manufacturer for applications indicated.
- f. <u>Cleaner</u>: Clean sheet vinyl flooring by vacuuming and mopping with a solution of water and a neutral detergent as recommended by manufacturer.
- g. <u>Concrete Slab Primer</u>: Non-staining type as recommended by flooring manufacturer.

4. COLOR SELECTIONS

a. <u>Materials</u>: Patterns and colors shall be as selected by Architect.

C. EXECUTION

- 1. EXAMINATION
 - a. Inspect and thoroughly clean surfaces to receive flooring material.
 - b. Report irregularities to Architect prior to proceeding with latex underlayment.
 - c. <u>Concrete Subfloors</u>: Verify that concrete slabs comply with ASTM F710 and the following:
 - 1) Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive.
 - 2) Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
 - 3) Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.

2. PREPARATION

- a. This Contractor shall prepare existing floors to receive new flooring by washing, etching, sanding, and filling or whatever other procedures are deemed necessary for satisfactory installation.
- b. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply, according to manufacturer's directions.
- c. Apply latex underlayment where required to correct subfloor.
 - 1) Underlayment shall be steel troweled smooth, and trowel marks showing through installed tile shall be reason to remove the tile and sand out trowel marks.

3. INSTALLATION

- a. <u>General</u>: Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.
- b. Install flooring tightly wall to wall, scribing and fitting neatly at walls, around columns, at cabinets, and around door frames.
- c. Adhere flooring to substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
- d. Install edge reducing strip at flooring termination or where abutting other flooring of different type or thickness if floor levels will not meet.

4. BASE INSTALLATION

- a. Apply continuous base to thoroughly dry material only.
- b. Install exterior corners before installing straight pieces.
 - 1) Form inside corners on job from straight pieces by cutting an inverted V-shape notch in toe of wall base at the point where corner is formed.
 - 2) Shave back of base where necessary to produce snug fit to substrate.
 - 3) Use pre-molded exterior corners.

5. CLEANING

- a. Two weeks after new flooring has been installed, clean thoroughly with soapless detergent, scrubbing and rinsing thoroughly, as per manufacturer's recommendations.
- b. Remove excess adhesive carefully as recommended by the floor covering manufacturer.
- c. Keep traffic off finished floors after cleaning and waxing.

09 68 00 - CARPETING

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. The provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73</u> <u>00 SUPPLEMENTARY CONDITIONS</u> and the sections included under Division <u>1</u> <u>GENERAL REQUIREMENTS</u>, are included as a part of this section as though bound herein.
 - b. See Section <u>09 65 00 RESILIENT FLOORING</u>.

2. SCOPE

a. This section covers all items, articles, materials, operations and methods to install all carpet and required accessories as necessary for a complete installation and as shown on the Drawings and/or as herein specified.

3. SYSTEM DESCRIPTION

- a. <u>Accessibility Requirements</u>:
 - 1) Floor surfaces shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations.
 - 2) These requirements supersede Technical Specifications in this section.
- b. Provide proper length rolls to eliminate random cross seams.
 - 1) Random cross seams will not be permitted.
 - 2) All seams shall be shown on shop drawings.

4. SUBMITTALS

- a. <u>Samples</u>:
 - 1) The carpet installer shall submit three (3) samples of each color and pattern of carpet selected for the Architect's review.
 - 2) These samples shall be accompanied by manufacturer's specifications, covering the construction of the carpet.
- b. Certificates signed by manufacturers of carpet certifying that their products comply with specified requirements.
- c. <u>Manufacturer's Instructions</u>:
 - 1) The carpeting manufacturer shall furnish to the Architect, three (3) printed copies of the manufacturer's recommendations for the care, cleaning, and maintenance of the carpet furnished.
 - 2) After the installation is completed, the carpet manufacturer shall provide one of his representatives to thoroughly instruct the Owner's maintenance personnel in the care, cleaning, and maintenance of the installed carpet.
- 5. QUALITY ASSURANCE
 - a. Prior to ordering carpet, the Contractor shall submit to the Architect for approval a certified flammability test report from an approved impartial testing laboratory.

- b. The installation shall also be tested for the amount arid character of the smoke generated and the fuel contribution of the assembly.
 - 1) Method of testing shall comply with the requirements of the State Building Code
 - 2) Results of these tests shall be shown in the report.
- c. A certification shall be provided by the carpet manufacturer, stating that the register numbers on each roll of carpet furnished was manufactured in accordance with these Specifications.
- d. Carpeting shall have a minimum average flux of not less than 0.2 watts/sq.cm. per ASTM E-648 (floor radiant panel test) requirements and shall meet Federal Flammability Test, Fed. Std. DOC-FF-1-70.
- e. <u>Chemical Emission/Indoor Air Quality</u>: All carpet, pad and adhesive specified must be in compliance with the Carpet and Rug Institute (CRI) Green Label Plus testing program.
 - 1) The program label and registration number serve as evidence of compliance.

6. DELIVERY, STORAGE AND HANDLING

- a. Carpet shall be delivered to the jobsite in the original mill wrappings with each roll having its size, dye lot, material, and register number properly marked on each bale.
- b. The carpet shall be stored under cover in dry, well ventilated spaces as soon as it is delivered to the jobsite.
- c. Protect from damage, dirt, stains, and moisture.
- d. When delivered to the jobsite, deliver register number tags to the Architect along with a sample of each carpet cut from the roll.
- 7. PROJECT CONDITIONS
 - a. <u>General</u>: Comply with CRI 104, Section 6: "Site Conditions".
 - b. <u>Space Enclosure and Environmental Limitations</u>: Do not install carpet until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.
 - c. <u>Subfloor Moisture Conditions</u>: Moisture emission rate of not more-than 9 Ibs.11000 s.f./24 hours where tested by calcium chloride moisture test in compliance with CRI 104, with subfloor temperatures not less than 55° F.
 - d. <u>Subfloor Alkalinity Conditions</u>: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.
- 8. EXTRA MATERIALS
 - a. <u>Waste Materials</u>:

- 1) Owner shall be permitted to inspect waste carpet scraps, so he may retain any for future repairs before they are removed from the jobsite.
- 2) Usable pieces of carpet not necessary to complete the work are to be left on the jobsite and placed in an orderly manner in such an area as designated by the Owner.
- b. Deliver extra materials to Owner.
- c. Furnish extra materials matching products installed as described below packaged with protective covering for storage and identified with labels describing contents.
 - 1) <u>Broadloom Carpet</u>: Furnish quantity of material, in full width roll, equal to 2% of amount installed for each carpet, but not less than 100 s.f.
 - 2) <u>Modular Carpet</u>: Furnish quantity of material, in full modular pieces, equal to 5% of amount installed, but not less than 50 s.f.

B. PRODUCTS

- 1. CARPET
 - a. <u>Basis of Design</u>:
 - 1) Mohawk Group.
 - 2) All carpet assemblies shall meet the requirements of the Green Label Plus Certification Program.
 - 3) Colors and patterns shall be as chosen by Architect from manufacturer's full range within the specified style:
 - a) <u>CPT-1 (Office Circulation, Meeting Rooms)</u>: Mohawk Group "Urban Virtues Collection", Point of Interest; Broadloom
 - b) <u>CPT-2 (Offices)</u>: Mohawk Group "Urban Virtues Collection", Spectrum V30; Broadloom
 - c) <u>CPT-3 (Entry Vestibule)</u>: Mohawk Group "Tuff Stuff II", Step Up II; 24" x 24" Walk-off modular; Color: Iron Ore 983.
- 2. CARPET ACCESSORIES
 - a. <u>Vinyl Base (VB-1)</u>: Johnsonite (Tarkett) wall base; 4" height, 1/8" traditional; up to two (2) colors as selected by Architect.
 - b. <u>Rubber Carpet Edge Guard</u>: Shall be by Johnsonite Inc, or Mannington Mills Inc. Colors as selected by Architect. Provide edge type as follows:
 - 1) <u>Carpet to VCT</u>: Johnsonite "CE-XX-A" with "MT-00-A" track base, or Mannington equal.
 - 2) <u>Carpet Termination Reducer</u>: "Johnsonite EG-XX-L", or Mannington equal.
 - c. <u>Adhesive</u>: Water-based, water resistant and non-staining as recommended by carpet manufacturer to comply with flammability and VOC requirements for installed carpet.
 - d. <u>Seaming Cement</u>: Hot-melt adhesive tape or similar product recommended by carpet manufacturer to taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

e. <u>Leveling and Patching Compounds</u>: Latex types as recommended by carpet manufacturer.

C. EXECUTION

1. PREPARATION

- a. Surfaces to receive carpet shall be thoroughly clean, smooth, free from irregularities, and dry; apply sealer recommended by carpet manufacturer to prevent dusting.
 - 1) Contractor shall prepare floors to receive new flooring by washing, etching, sanding, and filling or other procedures as necessary for satisfactory installation.
- b. Apply latex underlayment where required to correct subfloor.
 - 1) Fill concrete slab on grade control joints with latex or as recommended by manufacturer for proper substrate.
 - 2) Underlayment shall be steel troweled smooth to prevent marks showing through installed carpet.
 - 3) Substrate imperfections telegraphing through installed carpet will not be acceptable and shall be reason to remove.

2. CARPET INSTALLATION, GENERAL

- a. Comply with manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay or pile.
- b. At doorways, center seams under door in closed position.
 - 1) Do not place seams perpendicular to door frame, in direction of traffic through doorway.
- c. Do not bridge building expansion joints with continuous carpet.
- d. Carpeting in circulation areas, such as corridors and related areas, shall be installed with seams parallel to the long dimension of the corridor or area.
 - 1) Seams perpendicular to the long dimension will not be permitted, unless approved on shop drawings.
 - 2) When corridor width is less than width of carpet rolls, no seams will be permitted.
- e. Work and methods shall be in accordance with accepted best trade practice, and the proposed methods shall have been successfully used on similar installation.
- f. Install with pattern parallel to walls and borders, unless otherwise noted.
- g. Extend carpet under removable flanges and furnishing and into alcoves and closets of each space, unless otherwise noted.
- h. Provide cutouts where required, and bind cut edges where not concealed by protective edge guards or overlapping flanges.
- i. Exposed edges of carpeting shall be protected by a suitable rubber edge guard.

- 1) The rubber edge shall be fastened to the floor with suitable contact cement.
- j. Special care must be taken to secure tight, matched seams, continuously secured and as unnoticeable as possible after completed installation.
 - 1) Carefully install carpet on risers, steps, and nosing so that edges and seams are tight.
- k. The carpeting installer shall correct defects in materials or workmanship which may appear during the guarantee period by repairing or replacing with new materials as directed by the Architect.
 - 1) This shall include relaying portions of the carpet or other corrective work which, in the opinion of the Architect, is necessary to bring the installation into an acceptable condition.
 - 2) Work of this type required shall be done at no cost to the Owner.
- 3. <u>Broadloom Carpet Installation (Glue-Down Installation)</u>:
 - a. Fit sections of carpet prior to application of adhesive.
 - 1) Trim edges and butt cuts with seaming cement.
 - b. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions.
 - 1) Butt edges tight to form seams without gaps.
 - 2) Roll entire area lightly to eliminate air pockets and ensure uniform bond.
- 4. <u>Cleaning</u>:
 - a. On completion of the installation, dirt, carpet scraps not wanted by Owner, etc., must be removed from the surface of the carpet.
 - b. The carpet must be cleaned with a beater type vacuum cleaner.
 - c. Soiled spots or adhesive on the carpet shall be removed with the proper spot remover.
 - d. Loose pieces of face yarn must be removed with sharp scissors.

09 91 00 - PAINTING

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> apply to this section.
 - b. Division <u>3 CONCRETE</u> sections for Chloride Resistant Sealer to be applied on flat exterior concrete work.
 - c. Refer to Section <u>09 21 16 GYPSUM DRYWALL ASSEMBLIES</u> for priming and finishing of gypsum board wall construction.
 - d. Refer to Section <u>06 20 00 FINISH CARPENTRY</u> for priming and finishing of miscellaneous molding and trim.
 - e. Refer to Section <u>08 11 13 HOLLOW METAL DOORS AND FRAMES</u> for shop priming steel doors and frames
 - f. Refer to Section <u>05 52 00 METAL HANDRAILS</u> for priming and finish painting of metal handrails.

2. SUMMARY

- a. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
- b. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
- c. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural.
- d. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.
- e. If color or finish is not designated, the Architect will select from standard colors or finishes available.
- f. Painting includes field painting exposed bare pipes, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- g. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels, except where called for specifically.
- 3. SUBMITTALS
 - a. <u>Product Data</u>: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.

- b. <u>Samples</u>:
 - 1) Provide two (2) 4" x 4" samples (minimum size) of finish on actual materials.
 - 2) Provide samples of paint on the following substrates:
 - a) Stained or Natural Wood
 - b) Metal Substrate Materials

4. QUALITY ASSURANCE

- a. <u>Single-Source Responsibility</u>:
 - 1) Use only primers and undercoat paint, which are approved by the manufacturer of the finish coats.
- b. Lighting Level:
 - 1) Do not apply paint under poor lighting conditions.
 - 2) All painting work will be subject to inspection using a lighting level of 50 ft. candles or greater.
 - 3) Surfaces judged unsuitable by the Architect will be rejected.
- c. <u>Material Quality</u>:
 - 1) Provide the manufacturer's best quality trade sale paint material of the various coating types specified.
 - 2) Paint material containers not displaying manufacturer's product identification will not be acceptable.
- d. <u>Sample Installation</u>:
 - 1) Before proceeding with paint application, finish one complete surface of each paint system.
 - 2) Accepted sample area will serve as the minimum standard of quality throughout the work.
- e. <u>Certification</u>:
 - 1) Provide the manufacturer's certification that products supplied comply with all regulations controlling use of volatile organic compounds (VOC's).

5. DELIVERY, STORAGE AND HANDLING

- a. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name, product name, color, application and thinning instructions.
- b. Store materials in a designated area.
- c. Tightly cover containers in a well-ventilated area.
- d. Remove oily rags, waste, etc. from the buildings daily, and take other precautions to prevent fire.
- 6. JOB CONDITIONS
 - a. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 90 degrees F. unless otherwise recommended by the paint manufacturer.

b. Do not paint in snow, fog, rain, or mist; or when the relative humidity exceeds 85 percent.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Manufacturer</u>: Subject to compliance with requirements, provide products of one of the following:
 - 1) The Sherwin-Williams Co. (S-W) Basis of Design
 - 2) Devoe and Reynolds Co. (Devoe).
 - 3) The Glidden Company (Glidden).
 - 4) Pratt & Lambert
 - 5) MAB Paints (MAB).
 - 6) Benjamin Moore and Co. (Moore).
 - 7) Euclid
 - 8) Sonneborn
 - 9) PPG Industries, Pittsburgh Paints
 - b. <u>Paint Materials</u>:
 - 1) Sherwin-Williams (S-W) products are listed as the standard for each type of paint.
 - 2) Comparable first quality product of any of the approved manufacturers may be used.
 - 3) Submit product literature for each proposed paint to Architect for approval prior to ordering paint.
 - a) GYPSUM DRYWALL PRIMER
 - S-W PrepRite 200 Latex Wall Primer, B28W200
 - b) GYPSUM DRYWALL EGG-SHELL FINISH S-W ProMar 200 Latex Eg-Shell, B20W200 Series
 - c) GYPSUM DRYWALL SEMI-GLOSS FINISH S-W ProMar 200 Latex Semi-Gloss, B31W200 Series S-W DTM Latex Acrylic Coating, Semi-Gloss, B66-2
 - d) GYPSUM DRYWALL FLAT FINISH S-W ProMar 200 Latex Flat, B20W200 Series
 - e) FERROUS METAL INTERIOR/EXTERIOR PRIMER S-W DTM Latex Acrylic Primer/Finish, B66W1
 - f) FERROUS METAL INTERIOR.EXTERIOR SEMI-GLOSS FINISH S-W DTM Latex Acrylic Semi-Gloss Coating, B66-20
 - g) INTERIOR / EXTERIOR CONCRETE SLAB CLEAR FINISH Sonneborn Kure-N-Seal W
 - h) CLEAR SEALER STAINED WOOD S-W Wood Classics Polyurethane Varnish, A67 Series
 - c. All products furnished to the project site and applied at the project site shall comply with all applicable VOC regulations.
 - d. <u>Undercoats</u>: Provide pretreatment materials, sealers, and undercoats as recommended by the finish paint manufacturer as required to achieve professional quality finishes.
 - e. <u>Accessory Materials</u>: Linseed oil, shellac, turpentine, mineral spirits, and paint thinners are not specifically indicated but required to achieve professional quality finishes.

f. <u>Colors</u>: Provide paint colors and finishes to match those selected by Architect.

C. EXECUTION

1. EXAMINATION

- a. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint, including, testing for moisture content.
- b. Do not begin paint application until unsatisfactory conditions have been corrected.
- c. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

2. PREPARATION

- a. <u>General Procedures</u>:
 - 1) Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to painting.
- b. <u>Surface Preparation</u>:
 - 1) Clean surfaces free of all dust, dirt, and any other surface contaminants.
 - 2) Strictly conform to paint manufacturer's surface preparation directions.
- c. Painted Wood:
 - 1) Clean surfaces of dirt, oil, and other foreign substances as required. Sand surfaces exposed to view smooth and dust.
 - 2) Apply a knot sealer to all knots, pitch, and resinous sapwood.
 - 3) Prime or back-prime, all surfaces of the wood, whether exposed to view or not.
 - 4) Fill nail holes and imperfections in finish surfaces with putty or plastic wood filler and sand smooth.
- d. <u>Transparent Finished Wood</u>:
 - 1) Prepare surface as specified for painted surface.
 - 2) Continue with extra fine sandpaper to remove scratches and blemishes.
 - 3) When dry, lightly sand each coat of varnish just prior to application of next varnish coat.
 - a) Sand with the grain
 - 4) Remove dust with tack rag.
- e. <u>Gypsum Board</u>: Spackle and sand scratches and nicks.
- f. <u>Metal</u>:
 - 1) Solvent wipe with mineral spirits to remove oil and grease.
 - 2) Prepare following metals additionally as follows:
 - a) <u>Shop-Primed Steel</u>:
 - (i) Where abraded, touch-up with rust-inhibitive primer.
 - (ii) Where rust has developed, remove rust by hand tools or power tools before touching up with primer.

- b) <u>Bare Steel</u>:
 - (i) Power tool clean to conform to SSPC SP#-63.
 - (ii) Apply primer within three (3) hours after cleaning.
- g. <u>Materials Preparation</u>:
 - 1) Carefully mix and prepare paint materials in accordance with manufacturer's directions.
 - 2) Use only thinners approved by the paint manufacturer, and only within recommended limits.
 - 3) Finished Hardware that is not removed should be masked.
 - 4) Do not clean paint off of finished hardware with paint thinner or other solvent which can damage hardware finishes.

3. APPLICATION

- a. Apply coatings in accordance with manufacturer's directions.
 - 1) Use applicators and techniques best suited for substrate and type of material being applied.
- b. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and texture.
- c. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
- d. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
- e. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
- f. Allow sufficient time between successive coats to permit proper drying.
 - 1) Do not re-coat until paint has dried to where it feels firm, and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- g. <u>Minimum Coating Thickness</u>:
 - 1) Apply materials at not less than the manufacturer's recommended spreading rate.
 - 2) Provide a total dry film thickness of the entire system as recommended by the manufacturer.
- h. <u>Tinting</u>: Vary slightly the color of successive coats under the finish coat.
- i. Apply finish coats smooth, free of brush marks, streaks, laps, runs, sags, air bubbles, and excessive roller stipple.
- j. Apply paint in strict compliance with manufacturer's requirements for temperature and humidity.
- k. Seal tops and bottoms of doors with two coats of clear sealer.
- 4. NON-PAINT SURFACES SCHEDULE
 - a. Do not paint the following items unless specifically indicated on the drawings.

- b. Furred spaces, interior of vertical shafts, or spaces above suspended ceilings.
- c. Sprinkler heads.
- d. The wall surface beneath the base to $\frac{1}{2}$ inch below the top of the wall base.
- e. Door hinges and hardware.
- f. UL, FM, or other code required labels or equipment identification, rating, etc.

5. CLEANING

- a. <u>Cleanup</u>:
 - 1) At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 2) Upon completion of painting, clean glass and paint-spattered surfaces, remove spattered paint by washing and scraping.

6. PROTECTION

- a. Protect work of other trades, whether to be painted or not, against damage by painting.
 - 1) Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- b. Provide "wet paint" signs to protect newly painted finishes.
- c. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

7. INTERIOR AND EXTERIOR PAINT SCHEUDLE

- a. PS-1 Gypsum Drywall Egg-Shell Finish: up to four (4) colors
 - 1) Primer: S-W PrepRite 200 Latex Wall Primer, B28W200
 - 2) Second Coat: S-W ProMar 200 Latex Egg-Shell, B20W200 Series
 - 3) Third Coat: S-W ProMar 200 Latex Egg-Shell, B20W200 series
- b. PS-2 Gypsum Drywall Semi-Gloss Finish: up to three (3) colors
 - 1) Primer: S-W PrepRite 200 Latex Wall Primer, B28W200
 - 2) Second Coat: S-W DTM Latex Acrylic Coating, Semi-Gloss, B66-200
 - 3) Third Coat: S-W DTM Latex Acrylic Coating, Semi-Gloss, B66-200
- c. **PS-3** Gypsum Drywall Flat Finish: up to three (3) colors
 - 1) Primer: S-W PrepRite 200 Latex Wall Primer, B28W200
 - 2) Second Coat: S-W ProMar 200 Latex Flat, B20W200 Series
 - 3) Third Coat: S-W ProMar 200 Latex Flat, B20W200 Series
- d. <u>PS-4</u> Ferrous Metal (interior/exterior) Semi-Gloss Finish: up to three (3) colors
 1) Primer: S-W DTM Acrylic Primer/Finish, B66W1 (if shop-primed, touch-up as required)
 - 2) Second Coat: S-W DTM Latex Acrylic Coating, Semi-Gloss, B66-200.
 - 3) Third Coat: S-W DTM Latex Acrylic Coating, Semi-Gloss, B66-200

- e. **PS-5** Natural Wood Finish (interior) Satin Finish:
 - 1) First Coat: S-W Polyurethane Varnish A67 Series (4 mils wet/ coat)
 - 2) Third Coat: S-W Polyurethane Varnish A67 Series (4 mils wet/ coat)
 - 3) Fourth Coat: S-W Polyurethane Varnish A67 Series (4 mils wet/ coat)
 - 4) Fifth Coat: S-W Polyurethane Varnish A67 Series (4 mils wet/ coat)

f. PS-6 Concrete Slab (interior) – Clear Finish:

- 1) First Coat: Sonneborn Kure-N-Seal W
- 2) Second Coat: Sonneborn Kure-N-Seal W

10 26 13 CORNER GUARDS

- A. GENERAL
 - 1. SCOPE
 - a. This section includes the following types of wall protection systems:
 1) <u>Corner Guards</u>: See Drawings for locations.
 - 2. REFERENCES
 - a. National codes (IBC, UBC, SBCCI, BOCA and Life Safety).
 - b. American Society for Testing and Materials (ASTM).
 - c. Underwriters Laboratories (UL).
 - 3. SUBMITTALS
 - a. <u>General</u>: Submit the following in accordance with conditions of Contract and Section <u>01 33 01 SUBMITTALS</u>.
 - b. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
 - c. Shop drawings showing locations, extent and installation details of corner guards. Show methods of attachment to adjoining construction.
 - d. <u>Samples for Verification Purposes</u>: Submit the following samples, as proposed for this work, for verification of color, texture and pattern.
 - 1) 12" long sample of each model specified including mounting hardware.
 - e. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.
 - f. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1 <u>GENERAL</u> <u>REQUIREMENTS</u>.
 - 4. QUALITY ASSURANCE
 - a. <u>Installer Qualifications</u>: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
 - b. <u>Manufacturer's Qualifications</u>: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.
 - c. <u>Code Compliance</u>: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA, Life Safety and CA 01350.
 - d. <u>Fire Performance Characteristics</u>: Provide engineered PETG wall protection system components tested in accordance with ASTM E119 and marked with UL

label indicating that they are identical to those tested in accordance with ASTM E84 for Class 1 characteristics listed below:

- 1) Flame Spread: 25 or less.
- 2) <u>Smoke Developed</u>: 450 or less.
- e. <u>Impact Strength</u>: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
- f. <u>Chemical and Stain Resistance</u>: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- g. <u>Color Match</u>: Provide wall protection components that are color matched in accordance with the following:
 - 1) Delta Ecmc of no greater than 1.0 using CIELab color space.
 - a) (Specifier note: Construction Specialties' colors are matched under cool white fluorescent lighting and computer controlled within manufacturing tolerances. Color may vary if alternate lighting sources are present.)
- h. <u>Single Source Responsibility</u>: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

B. MATERIALS

- 1. <u>Manufacturers</u>: Interior surface protection products specified herein and installed on the submittal drawings shall be manufactured by:
 - a. Construction Specialties, Inc.,
 - b. Architect approved equal.
- 2. <u>Materials</u>:
 - a. <u>Engineered PETG</u>:
 - 1) Extruded material should be high impact Acrovyn 4000 with shadowgrain texture, nominal .078" thickness.
 - 2) Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer.
 - 3) Colors to be indicated in the finish schedule from one of manufacturer's standard color range.
 - b. <u>Aluminum</u>:
 - 1) Extruded aluminum retainers should be 6063-T6 alloy, nominal .070" thickness and snap-on Acrovyn 4000 cover.
 - 2) Minimum strength and durability properties as specified in ASTM B221.
 - c. <u>Fasteners</u>:
 - 1) All fasteners to be non-corrosive and compatible with aluminum retainers.
 - 2) All necessary fasteners to be supplied by the manufacturer.
- 3. CORNER GUARDS

- a. Engineered PETG Corner Guards to be Acrovyn 4000 by Construction Specialties
- b. Surface mounted guards consisting of a continuous retainer with snap-on Acrovyn 4000 cover.
- c. Color matched end caps to be provided for full height applications.
- d. Attachment hardware shall be appropriate for wall construction.
- e. Install from top of wall base to finished ceiling.
- f. Cap top and bottom.
- g. Model SSM-20N 90° surface-mounted corner guard with 2" legs, 1/4" radiused cover and recycled PETG retainer.
 - 1) Color to be selected by Architect from manufacturer's standard selection.

C. INSTALLATION

- 1. EXAMINATION
 - a. <u>Verification of Conditions</u>:
 - 1) Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 2) Do not proceed until unsatisfactory conditions have been corrected.

2. PREPARATION

- a. <u>Surface Preparation</u>:
 - 1) Prior to installation, clean substrate to remove dirt, debris and loose particles.
 - 2) Perform additional preparation procedures as required by manufacturer's instructions.
- b. <u>Protection</u>:
 - 1) Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3. INSTALLATION

- a. Install the work of this section in strict accordance with the manufacturer's recommendations, using only approved mounting hardware, and locating all components firmly into position, level and plumb.
- b. Temperature at the time of installation must be between 65°-75° F and be maintained for at least 48 hours after the installation.
- 4. CLEANING
 - a. <u>General</u>: Immediately upon completion of installation, clean guards and accessories in accordance with manufacturer's recommended cleaning method.

b. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

5. PROTECTION

- a. Protect installed materials to prevent damage by other trades.
- b. Use materials that may be easily removed without leaving residue or permanent stains.

10 44 16 - FIRE EXTINGUISHERS AND CABINETS

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of contract, Section <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division 1 GENERAL REQUIREMENTS apply to this section.

2. SUMMARY

- a. <u>This Section includes the following</u>:
 - 1) Fire extinguisher cabinets for 10 lbs. fire extinguishers
 - 2) 6 liter and 10 lbs. fire extinguishers
 - 3) Mounting Brackets

3. SUBMITTALS

- a. Product data for each type of product specified.
- b. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
- c. Samples for initial selection purposes in the form of manufacturer's color charts showing full range of colors available for fire extinguisher cabinets.
- 4. QUALITY ASSURANCE
 - a. <u>Single-Source Responsibility</u>: Obtain fire extinguisher cabinets from one source from a single manufacturer.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Available Manufacturers</u>: Subject to compliance with requirements, supply products manufactured by one of the following:
 - 1) J.L. Industries.
 - 2) Larsen's Manufacturing Co.
 - 3) Potter-Roemer, Inc.
 - 4) Watrous Inc.
- 2. FIRE EXTINGUISHER CABINETS
 - a. <u>General</u>: Provide fire extinguisher cabinets where indicated of suitable size for housing 10 lbs. fire extinguishers (FE-1).
 - b. <u>Box Construction</u>: Heavy gage steel with white baked enamel finish; semirecessed construction fire-rated cabinet, equal to Larson FS-2409R4
 - 1) Miter and weld perimeter door frames.
- c. <u>Cabinet Type</u>: Rolled edge semi-recessed, similar to Larson Medallion Series cabinets.
- d. <u>Door / Trim Material and Construction</u>: Light Bronze Anodized with vertical clear or wire glass panel, similar to: Larson "Vertical Duo" door style.
- e. <u>Door Hardware</u>:
 - 1) Provide manufacturer's standard door-operating hardware for cabinet type, trim style, and door material.
 - 2) Provide either lever handle with cam action latch, or door pull, and friction latch.
 - 3) Provide concealed or continuous-type hinge permitting door to open 180 degrees.
- f. Protect finishes on exposed surfaces from damage by application of removable, temporary protective covering prior to shipment.

3. FIRE EXTINGUISHERS AND CABINETS

- a. <u>FE-1</u>: 10 lbs. Multi-purpose dry chemical extinguisher suitable for A, B, or C type fires.
 - 1) Stored in the semi-recessed cabinet specified in this section.
 - 2) See drawings for locations.
- b. <u>FE-2</u>: 10 lbs. Multi-purpose dry chemical extinguisher suitable for A, B, or C type fires.
 - 1) Provide complete with mounting bracket similar to Larson #821 bracket.
 - 2) Provide where noted on the drawings.

C. EXECUTION

- 1. INSTALLATION
 - a. Install items included in this section in locations and at mounting heights indicated, and which comply with applicable regulations of governing authorities.
 - b. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - c. Securely fasten mounting brackets and fire extinguisher cabinets to studs, square and plumb, to comply with manufacturer's instructions.

10 55 00 - POSTAL SPECIALTIES

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. See Section <u>02 75 10 SITE CONCRETE</u>.
 - 2. SCOPE
 - a. This section covers the furnishing of all labor, materials, tools and equipment required to provide all mailboxes as shown on the Drawings, as herein specified and/or as required for a complete job.
 - 3. JOB REQUIREMENTS
 - a. All details of the installation of postal specialties shall conform to current applicable standards and regulations of the U.S. Postal Service.

4. GENERAL REQUIREMENTS

- a. Postal specialties shall comply with the following:
 - 1) United States Postal Service (USPS):
 - a) United States Postal Service Standard, Cluster Box Units USPS-B-1118.
 - b) USPS Publication 16.
 - c) USPS Postal Bulletin.
- b. <u>Architectural and Transportation Barriers Compliance Board (ATBCB):</u> Americans with Disabilities Act Accessibility Guidelines (ADAAG) for Buildings and Facilities.
- c. <u>IBC</u>: International Building Code.
- d. <u>ASTM A 666</u>: Specification for Austenitic Stainless-Steel sheet, Strip, Plate and Flat Bar.
- e. <u>ASTM B 209</u>: Specification Aluminum and Aluminum Alloy Sheet and Plate.
- f. <u>ASTM B 221</u>: Specification Aluminum and Aluminum Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes.
- 5. SUBMITTALS
 - a. <u>Manufacturer's data sheets on each product to be used, including:</u>
 - 1) Construction details, material descriptions, dimensions and finishes.
 - 2) Preparation instructions and recommendations.
 - 3) Storage and handling requirements and recommendations.
 - 4) Installation methods.
 - b. <u>Shop Drawings</u>: Prepared specifically for this project; show configuration and dimensions of mailboxes, wall cuts, and interface with other products.

c. <u>Verification Samples</u>: For each finish product specified, two samples, minimum size 2" square, representing actual color and texture.

6. DELIVERY, STORAGE AND HANDLING

- a. Inspect the materials upon delivery to ensure that specified products have been received.
- b. Store materials protected from exposure to harmful weather conditions.
- c. Handle materials to prevent damage or marring of finish.
- d. <u>Warranty</u>: Manufacturer's standard warranty to repair or replace components of postal specialties that fail in materials or workmanship within 1 year from date of Substantial Completion.

B. MATERIALS

- 1. MANUFACTURERS
 - a. <u>Acceptable Manufacturer</u>:
 - 1) Florence Corporation, 5935 Corporate Drive, Manhanttan, KS 66503; ASD: Tel: (785) 323-4400; Tel: (800) 275-5081. Email: sales@florencecorporation.com. Web: www.florencemailboxes.com.
 - b. For convenience and as a method of establishing the type and quality of products desired, numbers for the above manufacturer have been used.
- 2. CLUSTER BOX UNITS
 - a. <u>Cluster Box Units (CBU) Mailboxes</u>:
 - 1) Must be an officially licensed product of the USPS.
 - 2) Consisting of multiple compartments enclosed within freestanding, pedestal mounted cabinet.
 - 3) Provide access to compartments for distributing incoming mail and collecting outgoing mail from front of unit by unlocking master lock and swinging pair of side-hinged master doors to provide accessibility to entire group of compartments.
 - 4) Provide access for each compartment for removing mail by swinging compartment door.
 - 5) Provide slot for outgoing mail collection in weather protection hood.
 - 6) Comply with USPS-B 1118 ("F" Specifications) as manufactured by Florence Corporation.
 - 7) <u>Model</u>: Vital[™] Series 1570 Cluster Box Unit (CBU), an officially licensed product of the USPS.
 - a) Model 1570-16 Type III.
 - b) Sixteen (16) Compartments.
 - c) 3 1/4" High.
 - d) Two (2) Parcel Compartments.
 - e) One (1) Outgoing Mail Receptacle.
 - f) Compartment Depth: 15"
 - g) <u>Cabinet</u>: 0.10" thick welded aluminum sheet.
 - h) <u>Doors</u>: Minimum 0.125" thick aluminum with stainless steel hardware and hinges.

- i) <u>Locks:</u> 5-pin cylinder cam lock with spring-loaded cover in each unit, 3 keys each lock. (USPS 1172 910 Lock).
- j) <u>Pedestal</u>: Standard aluminum pedestal designed to ensure unit installed height meets all USPS installation requirements without additional adjustment.
 - (i) 14 1/2" high pedestal standard with Types III, IV and VI.
 - (ii) Powder Coat Finish: Color selected by Architect.
- k) Compartment Identification:
 - (i) Standard silver adhesive identification decals, 1.5" high x 1 3/4" wide, containing up to 5 characters.
- 3. RECESSED USPS KEY KEEPER
 - a. <u>USPS-approved, recess mounted key keeper</u>:
 - 1) Model 1090.
 - 2) Confirm location with Architect.

C. EXECUTION

- 1. EXAMINATION
 - a. Verify that openings in wall are correctly located, aligned, and sized for mailboxes.
- 2. PREPARATION
 - a. Clean surfaces thoroughly prior to installation.
- 3. INSTALLATION
 - a. Install in accordance with manufacturer's instructions.
- 4. CLEANING
 - a. Clean surfaces with mild dish detergent.
 - 1) Do not us harsh abrasive cleaners.
 - 2) Lubricate locks with graphite type lubricants only.
- 5. PROTECTION OF INSTALLED PRODUCTS
 - a. Protect finishes from damage by construction activities.

11 30 00 - RESIDENTIAL EQUIPMENT

A. GENERAL

- 1. SCOPE
 - a. The work required under this section consists of residential appliances and related items necessary to complete the work shown on the Drawings and/or as herein specified.

B. MATERIALS

- 1. <u>General</u>: Appliances shall be Whirlpool unless noted otherwise. Color as selected by Architect from samples of manufacturer's standard finishes as submitted by Contractor.
- 2. REFRIGERATOR
 - a. <u>At Apartment Units</u>:
 - 1) Model No. WRT134TFD
 - 2) 28" wide
 - 3) 14.3 cubic foot
 - 4) Color: White
 - 5) Energy Star.
 - b. At HC Apartment Units:
 - 1) Model No. WRT104TFDW
 - 2) 28" wide
 - 3) 14.3 cubic foot
 - 4) ADA Compliant
 - 5) <u>Color</u>: White
 - 6) Energy Star.
 - c. <u>Community Room Kitchen</u>:
 - 1) Model No. WRS586FLDM
 - 2) Energy Star
 - 3) Stainless Steel
 - 4) Side-by-Side
 - 5) Water/Ice in Door.
- 3. RANGE
 - a. <u>At All Apartment Units</u>:
 - 1) Model No. WFC340SOAW
 - 2) 30" Free-Standing
 - 3) Self-Cleaning
 - 4) Electric Range
 - 5) ADA compliant front controls
 - 6) <u>Color</u>: White.
 - b. <u>Community Room Kitchen</u>:
 - 1) Model No. WEC 310 SAGS
 - 2) 30" Free Standing
 - 3) Self Cleaning oven
 - 4) Electric Range
 - 5) ADA Compliant.

- 4. RANGE HOOD
 - a. <u>At all Apartment Units</u>:
 - 1) Air King ducted range hood, E50Q Series, Energy Star, 30" wide (except at studio unit #118-24" wide.
 - 2) At Handicapped Accessible Units, provide E50Q ADA Series with wallmounted dual rocker switch control.
 - b. <u>At Community Room Kitchen</u>:
 - 1) Air King ducted range hood, E50Q-ADA Series, Energy Star, 30" wide with wall-mounted dual rocker switch control.

5. COOKTOP FIRE SUPPRESSION

- a. "Rangehood" by Stove Top Fire Stop.1) Provide one (1) unit per pair of burners.
- 6. WALL SHIELD
 - a. Stainless Steel.
 - b. Provide at rear wall of ranges.
 - c. Where range abuts a side wall, provide wall shield at both rear and side walls.

7. WASHER

- a. Model No. WFW75HEFW
- b. Front-Load
- c. Energy Star
- d. <u>Color</u>: White
- e. Install in Laundry Room 115.
- 8. DRYER
 - a. Model No. WED92HEFW
 - b. Front-Load
 - c. Energy Star
 - d. <u>Color</u>: White
 - e. Install in Laundry Room 115.
- 9. INSTALLATION
 - a. All appliances shall be delivered on time in accordance with a pre-arranged delivery schedule and shall be "drop-shipped" at the point of location in specific units.

- b. Install all materials in accordance with manufacturer's written instructions.
- c. Provide all piping, wiring, connections, etc., as required for a complete installation.
- d. Contractor shall start up, test and inspect equipment after installation under normal operating conditions.
 - 1) If test or inspection shows defects, Contractor shall make corrections and re-test.

12 24 00 - WINDOW SHADES

A. GENERAL

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the ContractSection <u>00 72 00 GENERAL</u> <u>CONDITIONS</u> and Section <u>00 73 00 SUPPLEMENTARY CONDITIONS</u> and Division <u>1 GENERAL REQUIREMENTS</u> apply to this Section.

2. SUMMARY

- a. This Section includes manual mini-blinds and manual roller shades.
- b. <u>Related Sections</u>: The following Sections contain requirements that relate to this Section:
 - 1) Wood blocking and grounds are included in Division <u>6 WOOD,PLASTICS</u> <u>AND COMPOSITES.</u>

3. SUBMITTALS

- a. <u>General</u>: Submit the following in accordance with Conditions of Contract and specification section <u>01 33 01 SUBMITTALS</u>.
- b. Product data for each type of shade specified. Include printed data on physical characteristics.
- c. Shop drawings showing location and extent of shades.
 - 1) Show installation details at and relationship to adjoining work.
 - 2) Include elevations indicating shade units.
 - 3) Indicate locations of shade controls.
- d. Samples for initial selection purposes in manufacturer's standard sizes showing full range of colors, textures, and patterns available for each type of shade indicated.
- e. <u>Samples for Verification Purposes</u>: Two (2) 18" square samples of shade material for each color, texture, and pattern of shade required.
- f. Maintenance data for shades to include in Operating and Maintenance Manual specified in Division <u>1 GENERAL REQUIREMENTS</u>.

4. QUALITY ASSURANCE

- a. <u>Installer Qualifications</u>: Engage an experienced Installer who has specialized in installing shades similar to those required for this Project.
- b. <u>Surface Burning Characteristics</u>: Provide shades identical to those tested for the following fire performance characteristics as determined by testing identical products, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1) Test Method: NFPA 701, Small Scale Vertical Burn Test.

- c. <u>Single-Source Responsibility</u>: Obtain window coverings from one source of a single manufacturer.
- 5. PROJECT CONDITIONS
 - a. <u>Field Measurements</u>:
 - 1) Check openings by field measurements before fabrication.
 - 2) Show recorded measurements on shop drawings.
 - 3) Coordinate fabrication schedule with construction progress to avoid delay in the Work.
 - 4) Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating shades without field measurements.
 - 5) Coordinate wall and ceiling construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

B. PRODUCTS

- 1. MANUFACTURERS
 - a. <u>Mini-Blind Manufacturers</u>: Subject to compliance with requirements, provide product manufactured by one of the following:
 - 1) Levolor.
 - 2) Bali.
 - b. <u>Shade Manufacturers</u>: Subject to compliance with requirements, provide product manufactured by one of the following:
 - 1) Draper, Inc.
 - 2) Mecho Shade Systems, Inc.
 - 3) Lutron.
 - c. See Schedule at the end of this Section for list of rooms to receive shades.
- 2. MATERIAL AND FABRICATION
 - a. <u>Components</u>: Noncorrosive, self-lubricating materials.
 - b. <u>Mimi-Blind and Shade Units</u>: Fill opening with not more than 1/4-inch clearance at jambs and 3/8" clearance at sill.
 - 1) Fabricate end-to-end installations with terminations at mullions or other defined vertical separations.
 - c. <u>Installation Fasteners</u>: Not less than two fasteners per bracket, fabricated from metal non-corrosive to shade hardware and adjoining construction and to support shades under conditions of normal use.
- 3. MINI-BLINDS
 - a. Blinds shall be 1" pre-finished baked-on enamel aluminum horizontal mini-blinds; color to be selected from manufacturer's standard samples.
 - b. Color shall be selected by Architect from manufacturer's full range of standard colors.
- 4. SHADES
 - a. U.O.N., fabric shall be polyester reinforced vinyl fabric, with two color weave, and

10% fabric openness factor, color to be selected from manufacturer's standard samples.

- b. Shade cloth shall be affixed to roller by spline or other structurally sound method to allow shade to roll straight.
- c. Roller Tube shall be 1-7/8" O.D. 6063-T6 extruded aluminum with 0.055 wall thickness and clear anodized finish.
- d. The shade system shall be a smoothly operating chain-and-sprocket-driven rollershade system which incorporates a concealed, adjustable slip clutch and disk brake, permitting shade operation to be set in the static (stopping in any position) or dynamic modes (stopping at predetermined positions only).
 - 1) There shall be upper and lower stop limits to prevent over winding and unrolling to insure alignment and air clearance at the sill.
- e. Bottom Rail shall be extruded aluminum with spline channel for shade attachment and shall have injection molded end caps at each end.
- f. The Bracket Operating Assembly shall consist of 1/8" steel bracket and injectionmolded components of Dupont Delrin or equal, which are assembled on 7/16" diameter welded steel shafts.
 - 1) Reversible for left-hand or right-hand operation-wall jamb or ceiling mountable.
 - 2) The brackets shall have a capability to support a continuous Snap-Loc fascia allowing the chain to be offset with no exposed fastening to clear the fascia and the side channel.
 - 3) A Delrin drive sprocket shall be bead-chain operated with the chain's being qualified stainless steel 90 lb. test.
- g. Aluminum trim shall be constructed of 0.060-gage extruded aluminum with a baked enamel finish.
 - 1) See drawings for typical details.
- h. <u>Finishes</u>:
 - 1) All exposed aluminum parts shall have a spray painted, baked-enamel finish.
 - 2) Steel parts shall be satin finished, cadmium plated, or bonderized prior to painting.
- i. <u>Color of Metal Finishes</u>: As selected by the Architect from Manufacturer's full range of standard colors.

C. EXECUTION

- 1. EXAMINATION
 - a. Examine openings where shades will be installed prior to beginning installation.
 - b. Verify that critical dimensions are correct and surface conditions acceptable. Complete all finishing operations, including painting, before beginning installation.
 - c. Do not proceed with installation until unsatisfactory conditions have been corrected.

2. INSTALLATION

- a. <u>General</u>: Perform installation in strict conformance with Manufacturer's instructions.
- b. Install shades level and plumb, mounted not less than 1" from face of exterior glass.
 - 1) Coordinate shade installation with window hardware.
- c. Install metal parts isolated from concrete or mortar to prevent corrosion.
- d. Install mounting brackets with at least two (2) fasteners per bracket.

3. ADJUSTMENT AND CLEANING

- a. Ensure that units are level and that moving parts operate freely and in manner intended.
- b. Clean exposed surfaces and touch-up or replace damaged marred finishes.
- c. After completing the installation, clean shade surfaces according to the manufacturer's instructions.
- d. Remove surplus materials, packaging, rubbish, and debris resulting from the installation.
- e. Leave areas where installation occurred neat, clean, and ready for use.
- 4. WINDOW COVERING SCHEDULE
 - a. Provide manually operated mini-blinds and shades as follows:

ROOM	REMARKS	
APARTMENT UNITS	Mini-blinds - All windows	
LAUNDRY 123, 223	Mini-blinds - All windows	
COMMON SPACES	Shades – Exterior windows	
Community Room		
Offices, Meeting Rooms		

12 35 30 CASEWORK

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing and installing all labor, materials, tools, and equipment required to install all manufactured casework, etc., as shown on the drawings, as herein specified and/or as required for a complete job.
 - b. The casework as shown on the Drawings is intended to include a complete and total item. Each item shall be provided complete with hardware, accessories, features, and components.
 - c. The use of dimensions and specific requirements set forth in Drawings and Specifications are not intended to preclude the use of other acceptable manufacturer's product or procedures which may be equivalent, but are given for purpose of establishing standard of design and quality for materials, construction, and workmanship.
 - d. Casework indicated to receive sinks shall be constructed to allow for installation of sinks for sizes indicated.
 - 1) Coordinate with Plumbing for sink sizes.
- 2. RELATED DOCUMENTS
 - a. The provisions of Section <u>00 72 00 GENERAL CONDITIONS</u> and Section <u>00 73</u> <u>00 SUPPLEMENTARY CONDITIONS</u> and the Sections included under Division <u>1</u> <u>GENERAL REQUIREMENTS</u>, are included as a part of this Section as though bound herein.
- 3. DEFINITIONS
 - a. <u>Exposed Portions of Casework</u>: Include surfaces visible when doors and drawers are closed. Bottoms of casework more than 4' above floor and tops less than 6'-6" above floor shall be considered as exposed.
 - 1) Visible members in open cases or behind glass doors also shall be considered as exposed portions.
 - b. <u>Semi-Exposed Portions of Casework</u>: Includes those members behind opaque doors, such as shelves, divisions, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors.
 - 1) Tops of casework 6'-6" or more above floor shall be considered semi-exposed.
 - c. <u>Concealed Portions of Casework</u>: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.
- 4. SYSTEM DESCRIPTION
 - a. <u>Accessibility Requirements</u>: Accessible casework shall be provided as shown on the Drawings to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations.

1) These requirements supersede Technical Specifications in this Section.

5. SUBMITTALS

- a. The casework manufacturer shall furnish shop drawings giving details and sizes, including methods of attachment and anything pertinent to the installation work, as soon as possible after the award of the Contract.
- b. He shall include full Specification requirements; include three (3) color samples of finishes for the Architect's selection.

6. QUALITY ASSURANCE

- a. Defective workmanship or damaged components shall be corrected, repaired, or replaced, as requested by the Architect, without further cost to the Owner.
- b. <u>Manufacturer Qualifications</u>: At least 7 years' experience in the manufacturer and installation of the type of casework specified.
- c. <u>Installer Qualifications</u>: At least 5 years' experience in the installation of the type of casework specified and approval by manufacturer.
- d. Manufactured casework systems must conform to design, quality of materials, workmanship, and function as indicated. Minimum quality standards shall be custom grade in accordance with AWI Section 1600B, 6th Edition with additional requirements herein.

7. PROJECT CONDITIONS

- a. Do not deliver casework to project site until dry and heated storage space is provided. The casework is prefinished, and precaution must be taken to protect it against damage during installation and until final acceptance.
- b. Contractor shall be responsible for quantities as shown on casework layouts on Drawings.
- c. The manufacturer/supplier shall be responsible for making field measurements to insure proper fit of casework items.

8. GUARANTEE

- a. The entire installation shall be guaranteed for a period of 3 years from the date of Substantial Completion against defects in material and workmanship in accordance with the terms of the Contract.
- b. The guarantee shall cover repair or replacement, without cost to the Owner, of items which become defective within the 3-year period.
- c. Damage to the equipment caused by improper operation or misuse is not covered by this guarantee.

B. PRODUCTS

1. MANUFACTURER

- a. <u>Basis of Design</u>: Subject to compliance with requirements, provide products by Contractor's Choice.
- b. <u>Acceptable Manufacturers</u>:
 - 1) Contractor's Choice
 - 2) Advanta Cabinets
 - 3) Kraftmaid
 - 4) Merillat.
- c. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval must be accompanied by the "Substitution Request Form" and complete technical data for evaluation.
 - 1) All materials for evaluation must be received by the Project Manager and Specification Department at least ten (10) working days prior to bid due date. Additional approved manufacturers will be issued by Addendum.
 - 2) Refer to Section <u>01 25 00 PRODUCT SUBSTITUTION PROCEDURES</u> for additional requirements.
- 2. MATERIALS
 - a. <u>Plywood</u>:
 - 1) Provide 7-ply, hardwood plywood with maple exterior veneer and birch interior veneer.
 - 2) <u>Countertops</u>: Refer to Section <u>06 40 23 ARCHITECTURAL</u> <u>WOODWORK</u>.
 - b. <u>Hardwoods</u>:
 - 1) Solid lumber to be hardwood, kiln dried, select Poplar, Fir, or mill option lumber. Provide pressure-treated where noted.

3. HARDWARE AND MISCELLANEOUS

- a. <u>Hinges</u>: Self-closing, concealed wrap-around hinges with multiple adjustments and lifetime warranty.
 - 1) No edge fastening allowed.
 - 2) <u>Finish</u>: Brushed chrome, US26D finish.
- b. <u>Pulls</u>: Shall be accurately positioned on drawer and door fronts and positively through fastened with machine screws.
 - 1) Provide standard pulls on all casework drawer and door fronts.
 - 2) Finish/Color to be satin nickel.
 - 3) Pulls to be Allison Value Hardware, SKU #BP29119 G10 by Amerock.
- c. <u>Drawer Slides</u>: Manufacturer's standard, epoxy coated metal, nylon rollers, 75 Ibs. dynamic loading, and with positive in-stop and out-stop
- d. <u>Adjustable Shelf Supports</u>: Satin chrome minimum 100 lb. capacity support clip.
- e. <u>Miscellaneous</u>: Additional accessories shall be as noted on the drawings.

4. WORKMANSHIP, GENERAL

- a. Machine parts for accurate fit and assemble with appropriate fastenings and adhesives to result in true, square, level, and plumb units.
- b. Verify dimensions of other trades to be built into casework.
- c. Provide removable or false backs for access or concealment of plumbing items.
- d. Scribe tops and backsplashes to walls and other adjoining vertical surfaces.
- e. There shall be a 1-1/2" maximum scribe with casework at end walls unless shown otherwise.
- f. Casework components shall be solid hardwood or hardwood plywood with wood veneer.
 - 1) <u>No particleboard will be allowed.</u>

5. CASEWORK CONSTRUCTION

- a. All Cabinets shall be constructed of plywood.
- b. <u>Boxes</u>:
 - 1) <u>Base Cabinets:</u>
 - a) Two Plywood Stretcher Rails.
 - b) 3-8" Plywood Back, Bottom and Sides.
 - c) 3/4" x 1 1/2" Solid Wood Face Frame with 3" Center Stile.
 - d) 1/2" Half-Depth Plywood Shelf.
 - e) 3/8" x 4" High Plywood Recessed Toe-Kick (Recessed 3 3/8" Deep).
 - f) Cabinet Interior features Natural Maple Laminate.
 - 2) <u>Wall Cabinets</u>:
 - a) 1/2" Plywood Top and Bottom.
 - b) 3/4" x 1 1/2" Solid Wood Face Frame.
 - c) 3/8" Plywood Sides and Backs.
 - d) Cabinet Interior features Natural Maple Laminate.
- c. Fixed and Adjustable Shelves and Dividers:
 - 1) 3/4" plywood with wood veneer and edge banding.
 - 2) Number of adjustable shelves provided, unless indicated otherwise on the Drawings or on the Schedule:
 - a) <u>Tall Casework</u>:
 - (i) Four (4) up to 84"
 - (ii) Five (5) up to 90"
 - (iii) Six (6) up to 96"
 - b) <u>Base Casework</u>:
 - (i) One (1) up to 36"
 - c) <u>Wall Hung Casework</u>:
 - (i) One (1) up to 24"
 - (ii) Two (2) up to 30"
 - (iii) Three (3) up to 42"
- d. Doors:
 - 1) Doors shall be Contractor's Choice:

- 2) <u>Hinged Doors (Unit Kitchens)</u>:
 - a) Contractor's Choice "Newberry Birch, Color: Autumn, stile and rail, square recessed panel.
 - b) Doors 48" and less in height shall have two (2) hinges per door.
- 3) <u>Hinged Doors (Community Room Kitchen)</u>:
 - a) Contractor's Choice "Newberry Birch, Color: Sarsaparilla, stile and rail, square recessed panel.
 - b) Doors 48" and less in height shall have two (2) hinges per door.
- e. <u>Drawers</u>:
 - 1) All wood drawer with 1/2" sides and back and 3/8" bottom.
 - 2) All styles feature natural wood finish.
 - 3) 20" deep drawer box with stapled butt joint construction.
 - 4) Drawer bottom stapled into sides, front and back.
 - 5) Self-closing, epoxy-coated guides for smooth, quiet action.
 - a) Rated at 100 lbs. capacity per drawer.
 - 6) Adjustable side-mount drawer guides with double rails for more stability.
 - 7) Built-in Drawer Stop.
 - 8) <u>Drawer Face</u>:
 - a) Constructed of 3/4" minimum plywood.
 - b) Glued and dovetail jointed.
- f. <u>Finish</u>: Multi-step process featuring stain sealer and multi-coat varnish.
- g. <u>Removable Sink Bases and Cabinets</u>:
 - 1) Where indicated on the Drawings, provide removable sink bases.
 - 2) Provide end panels as required, so that a finished appearance is visible if the sink bases are removed.
 - 3) At removable base cabinets, provide operable drawers.
- 3. <u>Countertops</u>: Refer to Section <u>06 40 23 ARCHITECTURAL WOODWORK</u>.

C. EXECUTION

- 1. INSTALLATION
 - a. Shop drawings and installation instructions furnished by the manufacturer shall be strictly adhered to.
 - b. Mechanics making the installation shall be experienced in this type of work and capable of the highest quality of workmanship.
 - c. Countertops shall be installed flush against wall.
 - 1) Provide clear sealant at top and around ends of countertops, endsplashes, and backsplashes where they meet wall surfaces and any additional joints, seams, or intersections.
 - d. Cut openings in countertops for sinks or other items required.
 - 1) Cut to size from template furnished by supplier of sinks or use the designated sinks on job.
 - 2) Seal all cut edges with either a one-part silicone sealant or catalyzed varnish.

- e. Make use of filler sections and scribe panels to fit casework work into specific dimensions.
- f. Provide maintenance instructions to Architect prior to request for final payment.
- 2. ADJUSTMENT
 - a. Adjust doors, drawer slides and other moving parts after installation to provide proper operation.
- 3. CLEANING
 - a. Exposed surfaces, edges, and casework interiors shall be cleaned, and construction and installation marks removed prior to acceptance by Owner.
 - b. Supplier of this equipment shall be responsible for the immediate removal and disposal of trash, crating, and construction debris.

21 00 00 - FIRE SUPPRESSION

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing all labor, materials, tools and equipment required to install, test and guarantee a completely automatic wet-pipe fire protection sprinkler system complete with freeze protected heads for wood framed projections as shown on the drawings, as herein specified and/or as required for a complete job.

2. RELATED DOCUMENTS

- a. The Fire Protection Contractor is bound by all the specific provisions of Division <u>I</u> <u>GENERAL REQUIREMENTS</u> of these specifications. Refer also to the remaining specification sections.
- b. <u>Codes</u>: The entire installation shall be in full compliance with applicable sections of the Indiana Fire Code, 2014 Edition (IFC 2012 Edition, First Printing) which shall be considered as part of these specifications.
- c. The system will be subject to approval of the nearest insurance office (ISO), the Owner's insuring agency, the local fire prevention bureau and any other state or local inspection bureau having jurisdiction.

3. SUMMARY OF WORK

- a. <u>Design, Coverage & Permits</u>:
 - 1) Include coverage at all above ground floor areas including areas beneath wood framed canopies.
 - a) For exceptions to coverage area requirements refer to the drawings.
 - 2) Sprinkler system layout shown on drawings is diagrammatic.
 - a) Sprinkler Contractor to design system to meet all applicable codes, providing certified drawings of sprinkler distribution system and receive approval and permits and pay any fees from all state and/or local agencies for design review and approval before proceeding with any work.
 - b) Provide Architect with two (2) copies of approved drawings and release letters.
 - 3) Provide design and certified drawings of sprinkler distribution system, receive approval and permits and pay any fees required by all state and/or local agencies for design before proceeding with any work.
 - a) Provide Architect with approved drawings and release letters.
 - 4) Utilize appropriate design methods required by NFPA-13R, 2009 edition.
- b. <u>Coordination</u>:
 - 1) Coordinate all work with other trades in order to eliminate possible conflicts.
 - 2) Sprinkler heads shall be <u>precisely</u> in the center of a tile and located with respect to other ceiling installation items.

- c. <u>Testing</u>:
 - 1) After system is complete, a hydrostatic test shall be made on each wet system at 200 psi for two (2) hours.
 - 2) Follow procedure as outlined by NFPA and provide any additional tests as may be required by NFPA and ISO.
- d. Work By Others:
 - 1) All electrical connections for controls and/or sensing devices shall be made by Electrical Contractor.
- e. Maintenance and Operating Instructions:
 - 1) Provide complete sets of information and maintenance and operating instructions, assembled in binders for Owner's records per <u>Section 00</u> <u>73 00 SUPPLEMENTARY CONDITIONS</u>.
- f. <u>Guarantee:</u>
 - 1) It shall be the duty of this Contractor at the time he leaves the premises, to leave all equipment clean and in top operating condition.
 - 2) Any defective work shall be replaced without cost to the Owner within a period of one (1) year following acceptance of the work.

B. MATERIALS AND INSTALLATION

- 1. Shall be as required by all applicable codes and as follows:
 - a. <u>Sprinkler Heads</u>:
 - 1) All shall bear U.L. & FM approval by Central, Viking, Gem, Reliable or Architect approved equal which will be as follows:
 - a) Quick response, residential heads in all living units.
 - b) Quick response elsewhere, unless otherwise noted
 - c) All areas with suspended acoustical tile ceiling: Recessed heads with white covers.
 - d) <u>Living Units</u>: Sidewall and sidewall extended coverage.
 - e) <u>Unheated Areas</u>: Dry sidewall.
 - f) <u>Other Areas (Mechanical Rooms, etc.)</u>: Pendent type.
 - g) <u>Trash Chute</u>: Bronze pendant type with fusible link.
 - h) Finish & Color: Selected by Architect.
 - i) <u>Grid Supported Heads:</u> Utilize FLEXHEAD SUPERFLEX, as manufactured by FlexHead Industries, to support heads which occur in lay-in ceiling areas.
 - b. <u>Cabinet</u>:
 - 1) Locate a steel cabinet containing spare heads, and one (1) sprinkler wrench for each size and type head at Utility Room on the ground floor.
 - 2) Provide only the required quantity of each type of head as designated in NFPA standards.
 - c. <u>Pipe & Fittings</u>:
 - 1) Shall conform to NFPA 13R and NFPA 13 Standards, latest edition.
 - Pipe shall be type "K" copper per ANSI B16-22 or CPVC Schedule 40 per ASTM F438 utilizing mechanical joint or solvent.
 - d. <u>Gate Valves:</u>
 - 1) Shall be OS&Y.

- e. <u>Water Service:</u>
 - 1) The connections shall be made by the Sprinkler Contractor in strict accordance with utility company and fire department rules and regulations.
- f. <u>Fire Department Connection/Test Connection:</u>
 - 1) Shall be as required per code.
- g. Identification Signs:
 - 1) Shall be provided for all systems and auxiliary drains, inspector's test connections, alarms, control valves, etc. as required by NFPA and/or local requirements.
- h. <u>Hangers:</u>
 - 1) Support all sprinkler piping, valves and other components as specified in accordance with NFPA and local requirements.
 - 2) Hangers shall be U.L. approved.

22 05 00 - COMMON WORK RESULTS FOR PLUMBING

A. GENERAL

- 1. SCOPE
 - a. This section of the Specifications is intended to describe basic materials and methods to be used for complete installation of the Work.
 - b. Refer also to individual sections of these Specifications and to the Drawings for detailed descriptions of systems.

B. PRODUCTS

- 1. MATERIALS
 - a. All materials shall be new, first quality and free from defects.
 - b. Where applicable, products shall bear the manufacturers name or trademark, model number, serial number and in the case of piping, wiring, etc., shall bear the nationally recognized Standard for Design (i.e., ASTM A53).

2. PIPE LABELS

- a. Labels as approved by Architect, complete with flow arrows.
- b. Labels shall be self- adhering type with colors, system designation and sizes as recommended by manufacturer:
 - 1) Seton
 - 2) Or equal.

3. SLEEVES AND FIRESTOPPING

- a. Provide sleeves for all penetrations through all floors and corridor walls, all weather and thermal barriers and all sound walls.
- b. Sleeves shall be 22-gauge galvanized steel or galvanized steel pipe sections except as noted.
- c. Provide caulk/sealer at all new and existing (where no caulk or sealant present) fire and draft stops in accordance with UL requirements.
- d. Contractor shall be responsible for the proper sizing of the sleeves and core drilled holes so that they are at least 1-1/2" larger in diameter than the penetrating item or as specifically required by the fire stopping system being utilized.
- e. Sleeves and core-drilled holes made excessively large or made and not used shall be fire-stopped.
- f. Provide shop drawings noting proposed firestopping systems and include information regarding UL assembly listing numbers.

C. EXECUTION

1. CLEANING AND ADJUSTING

- a. Clean and adjust all work, including existing items to remain, at completion of project.
- b. Where required, coordinate cleaning schedule with other Trades. Protect work as required.
- c. Clean and flush all piping systems and verify that all plumbing traps, fixtures and floor drains are clean and clear.
- d. Disinfect potable water systems as specified hereinafter.
- e. Clean construction dust, metal cuttings, grease, etc., from plenums, coils, equipment etc.
- f. Pay particular attention to cleaning (and polishing where applicable) of exposed equipment, pipes and ductwork in finished areas.

2. COORDINATION

- a. Coordinate routing of piping, ductwork, etc., prior to starting installation.
- b. Organize work to minimize down time for apartments which are to be occupied during the project.
- 3. CONNECTIONS TO EXISTING AND/OR NEWLY PLACED WORK
 - a. Connect new work to existing and/or other new work in a neat and approved manner.
 - b. Restore disturbed work to like new condition.
 - c. Inform Architect immediately if existing is in poor or unusable condition.
- 4. CUTTING AND PATCHING
 - a. Layout work carefully in advance, and where cutting channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support, or anchorage of mechanical equipment, the work is to be carefully done and any damage to the building, piping, or equipment repaired by skilled mechanics of the trades involved, at no additional cost to the Owner.

5. EXPANSION

- a. Install piping to allow for proper expansion and movement.
- b. Provide expansion loops, offsets, etc. as required to minimize pipe stresses.
- c. Provisions for expansion shall meet the requirements of the ASME Boiler and Pressure Vessel Code and Pressure Piping Standards.

- d. Where space is limited or where expansion cannot be accommodated as indicated above provide expansion joints.
- 6. PIPING
 - a. Piping shall be concealed, except as noted, in all finished areas.
 - b. Run pipes within chases, utility tunnels, mechanical rooms, or above accessible ceilings wherever possible.
 - c. Work shown is diagrammatic and shall be installed as required to meet field conditions.
 - d. Work shall not be closed up prior to completion of inspection and testing.
 - e. Provide escutcheons at all piping penetrations in finished areas.
 - 1) Where fittings extend through finished surfaces, provide deep well escutcheons for flush mounting to surface.
 - f. Provide pipe insulation at all pex or copper hot and all copper cold water lines with R-4 (minimum) "Armaflex" or equal.
 - g. Refer to plumbing fixture schedule for pipe protective insulations where required to comply with accessibility codes.

7. PIPE AND SYSTEM IDENTIFICATION

- a. All pipe and pipe coverings shall be labeled with system description and flow direction.
- b. Labels shall be as previously specified.
- c. Labels shall be placed at 10' intervals on all pipes, at each branch connection and adjacent to each valve or piece of equipment and at both sides of all wall penetrations.
- d. Labels shall be applied after completion of painting in area.
- e. Care shall be taken to ensure that surfaces are clean and free of dust before application.

8. DISINFECTION

- a. All domestic piping and appurtenances shall be flushed and disinfected prior to placing in service.
- b. After installation, testing and flushing, a 50-part per million chlorine solution shall be admitted into all new pipes and appurtenances and allowed to remain for 24 hours.
- c. The solution shall then be drained from the system and the system re-flushed.
 - 1) After this procedure is completed, samples shall be taken for testing. The sample shall be tested by an approved independent testing laboratory.

- If the sample fails to meet the requirements of the Florida State Department of Health and Senior Services, the procedures for disinfection and flushing shall be repeated until satisfactory results are obtained.
- d. Any material added to the system after disinfection shall be thoroughly disinfected before installation.
- e. Contractor to include all costs associated with disinfection and testing.

9. TESTING

- a. Furnish all materials, supplies, labor and power required for testing.
- b. Make preliminary test and prove work satisfactory.
- c. Notify Architect in ample time to be present for final testing of all piping.
- d. Tests shall be performed prior to concealing, covering or insulating work.
- e. Repair any defects, or if required by Architect.
- f. Replace defective work with new without additional cost to Owner.
- g. Contractor shall be responsible for work of other trades disturbed or damaged by tests and/or repair of work.
- h. Damaged work shall be returned to its original condition or replaced.
- i. Unless specified otherwise, all piping shall be hydrostatically tested to 150 psig.
 - 1) Disconnect and cap off piping connection to equipment not rated for such test pressures.
 - 2) Retest system at lower allowable pressure with equipment reconnected after remainder of system has been proven.
 - 3) Tests shall be two (2) hours in duration during which time systems shall show no signs of leakage.
 - 4) No repair work shall be conducted on system being tested during test.
- j. Perform any additional tests as may be required under other sections of the Specifications.

10. BONDING

- a. Any metallic piping systems shall be bonded electrically throughout.
- b. Provide jumpers across all non-conductive intervening section of pipe or devices.
- 11. PROTECTION
 - a. Contractor shall be responsible for work and equipment until finally inspected, tested, approved and turned over to Owner.

- b. After delivery, and before and after installation, protect work against theft, injury or damage.
- c. Carefully store material and equipment received on site which are not immediately installed.
- d. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.
- e. Any extra cost caused by loss or damage to equipment or systems shall be borne by the Contractor.
- 12. ACCESSIBILITY
 - a. Arrange all work for maximum accessibility for operation, maintenance and repair.
 - b. Install clear of windows, doors and other openings.
 - c. Maintain maximum headroom.
 - d. Provide access panels as previously specified at all equipment, valves, dampers, fire dampers, controls, etc., where concealed in walls or above inaccessible ceilings.
 - 1) Minimum 12" x 12" or as required for full servicing of equipment.
 - 2) Turn over to appropriate General Trade for installation.
 - 3) Coordinate exact placement as required and as approved by Engineer/Architect.
 - 4) Access panels shall be provided in any instance where new or revised construction conceals any of the above items.

13. EXCAVATION AND BACKFILL

a. Excavation and backfill for all underground plumbing work shall conform to St Joseph County Standards and Indiana Department of Transportation documents.

22 05 10 - SUPPORTS AND ANCHORS

A. GENERAL

- 1. SCOPE
 - a. Provide all hangers, supports and anchors in accordance with the following, unless otherwise indicated or detailed.
 - 1) Provide seismic restraints for piping in accordance with "Seismic Restraint Manual Guidelines for Mechanical Systems" published by Sheet-metal and Air Conditioning Contractors National Association, latest Edition.
 - 2) The seismic hazard level (SHL) for this building is SHL-C.
 - 3) Supports and restraints shall comply with details and tables in the above-referenced standard.
 - 4) Items not requiring special restraint are as follows:
 - a) Gas piping less than 1" inside diameter.
 - b) Piping in Mechanical Room less than 1-1/4" inside diameter, except as noted above.
 - c) All other piping less than 2-1/2" inside diameter.
 - d) All piping suspended by hangers less than 12" from the top of the pipe to the bottom of the support for the hanger.

B. PRODUCTS

- 1. HANGERS AND SUPPORTS
 - a. Provide hangers and supports for all pieces of piping as indicated or detailed. Grinnell, F & S, Uni-Strut or equal.
 - b. The equipment loads shall be supported from the building structural system only at panel points, refer to structural drawings and details.
 - c. Hangers shall be of adequate size to allow pipe insulation to run continuous through hanger.
 - d. All hangers and supports shall provide for 2" of vertical adjustment.
 - e. Provide insulated piping at hangers and supports with shield as follows:
 - 1) <u>Type</u>:
 - a) Elcen #240
 - b) Or approved equal.
 - 2) Where used in conjunction with rollers, shields shall be provided with maximum rib spacing to allow proper movement.

2. ANCHORS

- a. Anchor horizontal piping where indicated and wherever necessary to localize expansion to prevent undue strain on branches.
- b. Anchors:
 - 1) Heavy forged construction, entirely separate from supports.
- c. Provide slide type supports where only lateral control is required.

C. EXECUTION

1. SUPPORTS

HANGER SPACING TABLE			
Pipe (inches)	Rod (inches)	Steel Pipe Spacing (feet)	Copper Pipe Spacing (feet)
1⁄2 and 3⁄4	3/8	6	5
1 and 11/4	3/8	8	6
1½ and 2	3/8	10	8
21⁄2	1/2	11	8
3	1/2	12	10
4 and 5	5/8	16	12
6	3/4	16	12
8 to 12	7/8	20	N/A

a. Provide supports for horizontal piping (copper or ferrous) at intervals as follows (but not less than one per branch):

- b. Spacing for hangers on plastic piping shall be in accordance with manufacturer's recommendations based on maximum system temperature plus 10°.
- c. Where hangers or shields come in contact with non-ferrous metallic piping, provide plastic or rubber pipe guides or plastic or copper coated pipe components for portion in contact with piping.
- d. Support piping independently at all pumps, tanks and all other equipment so that equipment is not stressed by piping weight or expansion.
- e. Supports of wire, rope, wood, chain, strap, perforated bar, or any other makeshift device are not permitted.
- f. Provide any additional structural material that may be required for proper installation of hangers, anchors, guides and supports.
- g. Dip hangers and supports, including rods, inserts, etc., in zinc chromate primer before installation.
 - 1) To facilitate assembly, in lieu of dipping, rods may be painted immediately after installation.
- h. Lay underground piping on only solid undisturbed ground, except where

crossing another trench or excavation adjacent to building wall or foundation, and there, support piping on approved foundations of concrete or brick piers or cradles as directed.

- 1) <u>Bottoms of Trenches</u>:
 - a) Tamped hard, graded to secure pitch, and shaped to give substantial uniform support to lower third of full length of pipe, with minimum recesses excavated for bells and joints.
- i. Support and protect underground piping so that it remains in place without settling and without damage during and from backfilling.
 - 1) Replace any piping so settled or so damaged.

22 05 23 - GENERAL DUTY VALVES FOR PLUMBING PIPING

A. GENERAL

1. SCOPE

- a. Furnish all valves indicated, specified or required for satisfactory operation and complete control of systems and equipment.
- b. Furnish shut-off valves in all branch connections to mains and at inlets and outlets of all equipment.

3. REQUIREMENTS

- a. Valves shall have the manufacturer's name or trademark and working pressure cast into the body of the valve.
- b. Unless otherwise noted, valves shall have minimum rating of ANSI 125 class WSP.
- c. Valves shall not be smaller than line size except where specifically noted or approved.
- d. Valves shall be of one (1) manufacturer for each type of valve. Except as noted, valves shall be as manufactured by one of the following:
 - 1) Crane
 - 2) Stockham
 - 3) Nibco
 - 4) Powell
 - 5) Milwaukee
 - 6) Lunkenheimer.
- e Valves shall be compatible with piping and fluid characteristics for system on which they are installed.
- f. On copper piping systems, equivalent sweat solder and valves from the same manufacturer may be used on 2" and smaller piping, provided that seats, discs, stems, wedges, etc., are removed during soldering of valve.
- g. Valve packing and trim shall be asbestos free.
- 4. USAGE
 - a. Shut-off or stop valves shall be ball type as noted.
 - b. B&G style RF Circuit-setter, valves shall be used for balancing on domestic hot water return piping.

B. PRODUCTS

- 1. CHECK VALVES
 - a. <u>Two Inches (2") and Smaller</u>:

- 1) Valve shall have bronze Y-pattern ANSI 250 class body with integral seat, bronze disc and threaded ends.
- 2) Valves shall comply with current edition of Federal Specification WW-V-51, Class A, type IV.
- 3) Manufactured by one of the following:
 - a) Crane
 - b) Powell
 - c) Nibco
 - d) Grinnell
 - e) Stockham.
- b. <u>Two and One-Half Inches (2-1/2") and Larger</u>:
 - 1) Valves shall have ANSI 125 cast iron flanged body and cap conforming to ASTM A126, Class B.
 - 2) Sizes 18" and larger shall conform to ASTM A126, Class C.
 - 3) Disc shall be bronze in sizes in 4" and smaller and bronze or bronze faced iron in larger sizes.
 - 4) All valves shall conform to MSS-SP71.
 - 5) Manufactured by one of the following:
 - a) Crane
 - b) Powell
 - c) Grinnell
 - d) Nibco
 - e) Stockham.
- 2. BALL VALVES
 - a. <u>4" and Smaller:</u>
 - 1) Valves shall have a bronze body with reinforced Teflon seats and stem packing with a full port, chrome plated steel ball.
 - 2) All valves will have a minimum rating of 600 psi WOG, cold non-shock.
 - 3) Valves shall comply with current edition of Federal Specification WW-V-35 Type II Class 3.
 - 4) Apollo 70 series or an approved equal.
 - 5) Valve handles shall have a means to install a lock to satisfy OSHA lockout/tagout requirements.
- 3. COMBINATION SHUT-OFF VALVE WITH INTEGRAL BOILER DRAIN VALVES
 - a. Valves shall have brass body with full port chrome-plated ball, ball seal, PTFE.
 - 1) Include 3/4" FNPT drain outlet with 1/4 turn valve and cap.
 - 2) Zylem model UBY or equal.
- 4. COMBINATION BALANCING AND SHUT-OFF VALVES
 - a. Valves shall have brass body and chrome-plated brass ball with glass and carbon-fitted PTFE seating rings.
 - b. Maximum operating pressure of 300 psi and operating range of -4° F to 250°F.
 - c. Zylem model 300 or equal.
- 5. LUBRICATED PLUG VALVES

- a. For use as main, branch shut off valves, and stop valves on gas appliances. Valves shall have 200 psi working pressure.
 - 1) Provide wrench of size required for valve use.
- b. Valves are to be of the lubricated plug type, without taper, and with close tolerance between the plug and body sealing surfaces (.002" maximum clearance on sizes up to 2", .003" to .005" maximum or larger sizes).
- c. Valves are to have a stem seal of reinforced Teflon.
- d. Valves must have "built-in" means of moving the plug vertically to prevent possibility of sticking.
- e. Valves must have a leakproof, spring loaded ball and lubricant sealed check valve, and combination lubricant screw and button head fitting to prevent foreign matter from being forced into lubricant system.
- f. Valve plugs are to be floated on low-friction Teflon surfaces for extra ease of turning the lower surface to also act as a means of minimizing torsional stress in the spring.
- g. Valves are to be so constructed that the lubricant system has sufficient pressure to force lubricant over all seating surfaces.
 - 1) Extruded lubricant around stem is to be positive indication that lubricant system is full, and that there has been a minimum contamination of line fluids.
 - 2) <u>Types</u>:
 - a) Homestead 611 and 612
 - b) Nordstrom 142 and 143
 - c) Powell 2200 and 2201.

6. GAS STOP COCKS

- a. Bronze body and plug, flat head. 125 psi working pressure, air tested.
- b. <u>Types</u>:
 - 1) Powell 947
 - 2) Crane 952.
- c. Provide malleable iron wrench/lever by valve manufacturer for valve operation, 4" minimum lever arm.
- d. Shut-off service for gas pressures less than 2 psi with line sizes less than 1-1/2".
 - 1) Bronze body plug valve, AGA listed for natural gas service.
 - 2) Lever handle with check stops
 - a) McDonald 10701
 - b) Healey 4SL.
- 7. RELIEF VALVES
 - a. ASME approved and listed for types of service and AGA, FM or NFPA approved on gas-fired units.

- b. Coordinate and comply with all State boiler and pressure vessel Code requirements.
- c. <u>Capacity</u>: At least equal to BTU input capacity of heater in accordance with applicable Section ASME Code.
- d. Factory set for pressure required.
- e. Spring diaphragm type with test lever and automatically reseating after either temperature or pressure relief.
- f. Pipe water relief outlet full size to spill over adjacent floor drain, or as indicated.
- 8. VALVE TAGS
 - a. All valves that are remote from equipment or systems served shall be identified by means of brass tags, with stamped or etched numbers 3/4" high. Four (4) copies of a typed list showing the tag number, service and location of each valve tagged are to be furnished.
- 9. VALVE BOX
 - a. Valve boxes shall be extension type, cast iron, screwed, adjustable length.
 - b. Roadway covers shall be round plug type, suitable for easy removal, embossed "Water".

C. EXECUTION

- 1. INSTALLATION
 - a. Install all valves in the open position, close only after system has been flushed, drained and refilled.
 - b. Foreign materials found imbedded in seating surfaces will require installation of new trim or replacement with new valve at the Contractor's expense.
 - c. No valve shall be installed with its stem below the horizontal.
 - d. Where indicated or required for inaccessible overhead valves, furnish chainoperated handwheels, including rustproof chain and chain guide.
 - e. Provide drain valves at all low points in piping systems and at inlet.
 - 1) Valve shall be 3/4" hose bibb type, 125 WSP.

22 10 00 - PLUMBING PIPING

- A. GENERAL
 - 1. SCOPE
 - a. <u>Piping</u>:
 - 1) Provide all piping in accordance with the following requirements unless otherwise specified.
 - 2) Refer to Section <u>22 05 00 COMMON WORK RESULTS FOR PLUMBING</u> for Sleeves and Firestopping.
- B. PRODUCTS
 - 1. MATERIAL SCHEDULE
 - a. <u>Potable Water</u>:
 - 1) <u>Pipe</u>:
 - a) Seamless Type "L" hard copper, ASTM B88.
 - b) CPVC Schedule 40 pipe may be used within apartment units.
 - 2) <u>Fittings</u>: Shall be wrought copper solder joint fittings, ASTM B61, ANSI B16.22.
 - a) Wrought copper solder joint fittings, ASTM B61, ANSI B16.22.
 - b) <u>Press Fittings</u>: Copper and copper alloy press fittings shall conform to material requirements of SME B16.18 or ASME B16.22 and performance criteria of IAPMO Ps 117.
 - (i) Sealing elements for press fittings shall be EPDM.
 - (ii) Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer.
 - b. <u>Waste, Vent and Storm</u>:
 - 1) PVC pipe Schedule 40 with DWV style fittings.
 - a) Shall meet deflection standards of ASTM D-3033.
 - 2) NO-HUB cast iron pipe and fittings.
 - c. <u>Condensate Piping</u>:
 - 1) PVC pipe Schedule 40 with DWV style fittings.
 - 2) Type "L" hard copper, ASTM 88 with wrought copper solder joint fittings.
 - d. Natural Gas:
 - 1) <u>Pipe</u>: Black steel, ASTM A53 or A106 Grade B, Schedule 40, furnace welded or seamless.
 - 2) <u>Fittings</u>:
 - a) <u>Malleable Iron Fittings</u>: ASTM A47, class 150, ANSI B16.3 (except gas over 2 psi).
 - b) <u>Welded Fittings (Butt Welded)</u>: ASTM A234, Grade B, WPB, ANSI B16.9.
 - 3) <u>Piping 2" and Smaller</u>: screwed fittings (except gas over 2 psi).
 - 4) <u>Piping 2-1/2" and Larger</u>: Butt welded.
 - 5) All gas over 2 psi shall be welded construction.
 - e. <u>Miscellaneous</u>:
 - 1) <u>Piping Isolators</u>: Shall be galvanized steel with felt padding by Tolco or Elmdor/Stoneman.

C. EXECUTION

1. INSTALLATION

- a. Run piping straight and direct as possible, parallel with walls, partitions and other piping and neatly spaced for service and insulation.
- b. Hang piping at or in ceiling from construction above, as close as possible to bottom of slabs, beams, etc.
 - 1) Maintain maximum headroom at all times.
- c. Remove all foreign matter from piping before installation.
- d. Pipe shall be cut accurately to measurements established at building and shall be worked into place without springing or forcing.
- e. Arrange piping for maximum accessibility for maintenance and repair, and to properly clear windows, doors and other openings.
- f. No exposed chrome plated piping shall show tool marks or more than one (1) thread at fittings.
 - 1) Fittings, valves and hangers on chrome plated piping shall be chrome plated.
- g. Use reducing fittings for changes in pipe sizes.
- h. Provide dielectric couplings wherever copper and ferrous pressure pipe and/or fittings meet.
- i. Install piping isolators at each pipe hanger and pipe support for hot and cold water piping.

2. UNIONS

- a. Provide unions or flanges where indicated and in connections to all equipment, apparatus and specialties.
- b. Locate unions or flanges between shut-off valves and equipment.
- c. Screwed unions shall be ground joint type, for copper tubing; all brass; for steel malleable iron with brass seats; galvanized or black, same as piping in which used which is 2" or smaller and provide flanges for pipe 2-1/2" or larger.

3. EXPANSION

- a. Install piping so as to permit thermal expansion and movement at building expansion joints, without damage.
- b. Provide sufficient expansion loops, offsets, changes in direction and swing connections to keep stresses within limits set by ASME Code for pressure piping.
- 4. JOINTS

- a. Make joints in screwed piping with Teflon (PTFE) paste lubricant placed on male thread only.
 - 1) The use of Teflon tape is strictly forbidden on a metallic pipe threads.
 - 2) The only acceptable use of Teflon tape is threads on plastic piping only.
 - 3) Use graphite or Teflon paste lubricant on cleanout and drain plugs.
 - 4) Clean, debur and ream ends of pipe after cutting and threading and before installation.
- b. Make solder joints for copper tubing associated with potable water with noncorrosive lead-free flux and lead-free solder in accordance with manufacturer's instructions and by thoroughly competent workmen.
 - 1) Clean, debur and ream ends of pipe after cutting and before application of flux.
- C. All machine threaded assemblies utilized to install flanges or other piping connections shall have coating of Felpro C5-A anti seize lubricate or an approved equal applied to the threads to allow for easy assembly and disassembly in the future.

22 33 00 - DOMESTIC WATER HEATER SYSTEM

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to this Section.
 - 2. SCOPE
 - a. Complete domestic water heating system, including piping, valves, indirect water heaters, and recirculating pump as shown on the Drawings.

B. PRODUCTS

- 1. PIPE AND FITTINGS
 - a. Refer to Section 22 10 00 PLUMBING PIPING.
- 2. VALVES
 - a. Refer to Section <u>22 05 23 GENERAL DUTY VALVES FOR PLUMBING PIPING.</u>
- 3. PREVENTION OF WATER CONTAMINATION
 - a. Devices used for backflow prevention and cross connection control shall be as approved by the Indiana State Department of Health.
- 4. INDIRECT WATER HEATERS
 - a. Shall be stainless steel double wall model by Lockinvar or approved equal.
 - b. Unit to include 2" HDPE Foam and polypropylene jacket.
 - c. T&P relief valve is to be shipped with unit to be supplied with tank sensor installed.
 - d. Include Manufacturer's 5-year Limited Warranty against tank failure.
- 5. WATER RECIRCULATION PUMP
 - a. See Drawings for type.
 - b. Pump and fittings shall comply with NSF Standards 61 and 372 and low lead content requirements.

C. EXECUTION

- 1. INSTALLATION AND COORDINATION
 - a. For all major items of equipment, provide factory authorized verification of the

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installation, and include factory authorized start-up with documentation of startup and approval included in the Operating & Maintenance Manuals.

- b. Install and test backflow prevention devices in accordance with manufacturer's instructions and the requirements of the local Water Utility.
- c. Water heater installation, as well as associated equipment and piping connections shall be in accordance with the manufacturers' instructions. Coordinate as required.
- d. Verify exact layout requirements, and accessibility requirements for each item of equipment.
 - 1) Make necessary modifications to layout in field, to assure accessibility and clearances.

22 40 00 - PLUMBING FIXTURES

- A. GENERAL
 - 1. SCOPE
 - a. Furnish and install all plumbing fixtures as specified and/or indicated on Drawings, unless noted otherwise elsewhere.
 - b. Rough-in for and connect up all equipment requiring water supply and waste.
 1) Furnish all tailpipes, P-traps, etc., required for complete installation.
 - 2. PLUMBING FIXTURES-GENERAL
 - a. Fixtures and fittings shall be best quality, genuine white vitreous china, acid resisting enameled cast iron or stainless steel, as specified, free from defects.
 - b. Fixtures shall have manufacturer's guarantee label or trademark indicating first quality.
 - c. Exposed pipe, fittings, traps, escutcheons, valves, valve handles and accessories, both above and below fixtures, shall be heavy gauge chrome plated brass unless otherwise indicated.
 - d. Water closet, lavatory and shower fixtures have been chosen to meet low water flow requirements.

3. EQUIPMENT FURNISHED BY OTHERS

- a. Connect all equipment requiring water services and install all loose trim furnished with equipment, as specified and/or indicated, unless noted to be by others.
- b. Provide stop valves on all water connections.
- c. Refer to respective sections of Drawings and Specifications.
- 4. FIXTURE CONNECTIONS
 - a. Size of branch water piping shall be not less than listed in Plumbing Schedule with actual connection sizes as required by connection on fixture.
 - b. Furnish all tailpieces, P-traps, etc., as required for complete installation.
 - c. Provide chrome plated brass shut-off valves for supplies to all fixtures.
 - d. Provide protective pipe covering at all water and waste piping at handicapped lavatories and sinks.
 - 1) Material shall be as manufactured by one of the following:
 - a) Truebro
 - b) ProFlo
 - c) Plumberex.
 - 2) Refer to Plumbing Fixture Schedule for types and locations.

- e. Provide all necessary wax rings, setting compound, gaskets, etc., for a complete installation.
- f. Provide sealer under water closets, sinks, lavatories, etc.
- g. Provide finished caulk bead (color as directed by Architect) at lavatories, water closets, sinks, etc.
- 5. ATTIC STOCK
 - a. Provide to Owner one (1) each of the following as attic stock:
 - 1) Sink and faucet SK-1.
 - 2) Lavatory and facet LAV-1.
 - 3) Water closets WC-1.

B. PRODUCTS

- 1. SUPPLIERS
 - a. See Plumbing Fixture Schedule for plumbing fixture manufacturers and fixtures.
 - b. Provide all fittings, accessories, etc. a required for a complete installation.
 - c. Provide supply shut-offs at each fixture.
 - d. All exposed supplies and stops to be chrome plated, unless noted otherwise.

2. FLOOR DRAINS

- a. <u>Floor drains, unless otherwise noted</u>: Coated cast iron body with integral trap, double drainage flange and weep holes, and caulked outlet.
- b. Provide floor drains as manufactured by one of the following in sizes as noted on drawings:
 - 1) Zurn
 - 2) Watts
 - 3) Josam
 - 4) J.R. Smith
 - 5) Wade

C. EXECUTION

- 1. INSTALLATION
 - a. During course of construction, cover exposed fittings and protect fixtures. Uncover and thoroughly clean fixtures and fittings when directed.
 - b. Fixtures shall be in perfect condition at completion of job.
 - 1) Any fixtures not in perfect condition at that time, due to damage during construction or any other cause, shall be replaced by the Contractor at no additional charge.

- c. Flush valves, traps, etc. shall be installed accurately in vertical and horizontal planes as applicable.
- d. Clean all aerators and strainers at time of project completion.
- e. Refer to drawings for mounting heights of water closets, urinals and lavatories.

23 00 00 - HEATING, VENTILATING AND AIR CONDITIONING

- A. GENERAL
 - 1. SCOPE
 - a. Complete system as indicated on Drawings and, in general, consisting of, but not limited to, the following:
 - 1) All HVAC work shown on the drawings
 - Install items of VRF HVAC systems as specified in Section <u>23 06 55</u> <u>VARIABLE REFRIGERANT FLOW (VRF) HVAC SYSTEMS</u> and as shown on the Drawings
 - 3) Ductwork and HVAC work in core area and at units one each floor, as shown on Drawings. See Section <u>23 31 00 DUCTWORK</u>.
 - 4) Installation of exhaust fans.

2. ELECTRICAL

a. All electrical equipment furnished under this section of the Specifications shall conform to applicable provisions of Division <u>26 ELECTRICAL</u>.

3. SUBMITTALS

- a. <u>Product Data</u>: For each type or model include the following:
 - 1) Complete fan performance curves for Supply and Exhaust Air with system operating conditions indicated, as tested on an AMCA Certified Chamber.
 - 2) Sound performance data for Supply and Exhaust Air, as tested on a AMCA Certified Chamber.
 - 3) Motor ratings, electrical characteristics and motor and fan accessories.
 - 4) Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
 - 5) Estimated growth rate of each installed unit.
 - 6) Installation, Operating and Maintenance Manual (IOM) for each model.
 - 7) Remote Panel description to include all functions.
 - 8) Color chart including a palette of available standard paint finishes
 - 9) Energy core performance data for both summer and winter operation.
 - 10) Electrical consumption data and construction specification for electric heater, to include heat output, warranty and safety certifications.

4. QUALITY ASSURANCE

- a. <u>Product Options</u>:
 - 1) Drawings must indicate size, profiles and dimensional requirements of Energy Recovery Unit and are to be based on the specific system indicated. Refer to Section <u>01 60 00 PRODUCT REQUIREMENTS</u>.
- b. <u>Certifications</u>:
 - 1) Entire unit shall be ETL Certified per U.L. 1995 and bear an ETL sticker.
 - 2) Energy cove shall be AHRI Certified, per Standard 1060.
- 5. COORDINATION

- a. Coordinate size and location of all building penetrations required for installation of each unit and associated duct and electrical systems.
- b. Coordinate sequencing of construction of associated plumbing, HVAC, and electrical supply.

6. EXTRA MATERIALS

- a. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1) <u>Filters</u>:
 - a) One (1) set of MERV 8 disposable filters for each ERV unit.
 - b) Four (4) sets of filters for the apartment air handlers.
 - c) One (1) spare disposable filter for each common area air handler.

B. PRODUCTS

- 1. ENERGY RECOVERY VENTILATORS
 - a. Shall be RenewAire or equal complying with the following:
 - 1) The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.
 - No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.
 - 3) The unit case shall be constructed of 20-gauge steel, with lapped corners and zinc plated screw fasteners.
 - a) The case shall be finished with textured, powder coat paint (GR90 case shall be constructed of G90 galvanized steel.)
 - 4) Access doors shall provide easy access to blowers, ERV cores, and filters.
 - a) Doors shall have an airtight compression seal using closed cell foam gaskets.
 - 5) Case walls and doors shall be fully insulated with 1", expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.
 - 6) The ERV cores shall be protected by a MERV-8 rated, spun polyester, disposable filter in both airstreams.
 - 7) The unit shall have a line-cord power connection and be supplied with an internal 24 VAC transformer and relay.
 - 8) Standby power draw shall not exceed 1 Watt for the unit along with an optional automatic control.
 - 9) Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency.
 - a) The blower motors shall be totally enclosed (TEFC) and shall be supplied with factory installed motor starters.
 - b) Direct drive models shall be EISA compliant for energy efficiency with open drip proof design and integral thermal protection.
 - 10) Blowers shall be quiet running, forward curve type and be direct drive. Motors shall be ECM type.
 - 11) Units serving common areas, provide VFD's for both air streams.

- The unit electrical box shall include factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.
 Describe entire of factory experiment of filter elements.
- 13) Provide optional factory mounted filter alarms.

2. EXHAUST FANS

- a. Shall be the size and capacity indicated, as manufactured by one of the following:
 - 1) Panasonic
 - 2) Broan
 - 3) Greenheck
 - 4) Loren Cook
- b. See Exhaust Fan Schedule for model numbers.

3. UNIT HEATERS

- a. Shall be the size and type indicated on the Drawings as manufactured by one of the following:
 - 1) Sterling
 - 2) or equal products manufactured by one of the following:
 - a) Trane
 - b) Modine.

4. CONTROL AND BACK DRAFT DAMPERS

- a. Manufactured by one of the following:
 - 1) Lloyd Industries
 - 2) Ruskin.
- b. Motorized dampers shall be UL Listed and shall limit air leakage to less than 1 cfm per square foot.
- c. Seals shall be vinyl foam.
- d. Damper controls and masters shall be manufactured by Belimo.

C. EXECUTION

- 1. INSTALLATION
 - a. Coordinate exact equipment locations with actual equipment provided and with the work of other trades.
 - b. Make necessary adjustments to allow for working clearances and access.
 - c. All work shall be in accordance with manufacturer's installation requirements and additional code requirements.
 - d. Turn all specialty tools and instructions over to Owner.
 - e. Coordinate installation of equipment with other trades for proper connection of ductwork, power, piping and controls.

- f. Maintain adequate service clearance around all equipment including the work of other trades.
- 2. COORDINATION
 - a. Coordinate mounting connection details of the ERV units.
 1) Utilize stainless steel bolts or screws for attachment to steel frame.
 - b. Coordinate the installation of unit heaters with building framing to provide framing or blocking where needed.
 - c. Also coordinate the routing of piping with other trades.

3. ERV UNIT STARTUP SERVICE

- a. Engage a factory authorized service representative to perform startup service.
- b. Clean entire unit, comb coil fins as necessary, install clean filters.
- c. Measure and record electrical values for voltage and amperage.
- d. Startup inspection to include all items from manufacturer's IOM.1) Report results to Architect.

4. DEMONSTRATION AND TRAINING

- a. Engage a factory authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain entire unit.
 - 1) Refer to Section <u>01 75 16</u> STARTUP PROCEDURES for required Owner demonstration and training.

23 05 00 - COMMON WORK RESULTS FOR HVAC

A. GENERAL

1. SCOPE

- a. Provide all required labor, materials, equipment and Contractor services necessary for the complete installation of equipment indicated herein and on the Drawings, complete with all related services.
- b. Review all existing building conditions as they relate to the work and include costs in bid.

2. CONTRACT DOCUMENTS

- a. The Drawings listed in the Drawing Index, together with these specifications, are an integral part of the Contract.
 - 1) What is called for in one is as binding as if called for in both.
 - 2) In case of conflict, the greater quantity or better quality is to prevail, subject to the approval of the Architect.
- b. Drawings are diagrammatic and generally indicative of the work.
 - 1) Piping and systems shall follow arrangement as much as possible, however actual field conditions shall dictate.
 - 2) Provide necessary modifications to meet field conditions and avoid conflict with other trades.
 - If resolution cannot be reached without compromising the design intent, these conflicts shall be presented (in writing if requested) to the Architect for resolution.
 - 4) In conflict areas, complete only work not affected by the conflict prior to resolution.
 - 5) Other items completed in these areas are solely at the Contractor's risk and cost of resulting changes will be borne by said Contractor.
 - 6) Due to the small scale, Drawings do not show all valves, fittings, appurtenances, duct transitions, access panels, elevation changes, and various other items required for a complete system or as might be required by the Specifications.
 - 7) Where required, these items shall be provided without additional cost for a complete and operating system.
- c. Drawings are <u>not</u> to be scaled for the purpose of equipment installation.
 - 1) All measurements to be derived from field conditions.
 - 2) All measurements must be verified.
 - 3) The Contractor is responsible for all work fitting into place in a satisfactory and workmanlike manner.
- d. Schedules are provided as a convenience to the Contractor.
 - 1) The Contractor shall verify the actual quantities and other information and shall provide the necessary quantities and arrangements required.
- e. Arrange work for maximum clearance and accessibility to all work.
- 3. CODES, STANDARDS AND PERMITS

- a. All work shall be in accordance with National, State and Local codes in force at time of bidding.
 - In addition, the Contractor shall be responsible for obtaining all necessary permits and inspection approvals as the work progresses. Any work which is completed without these approvals and found to be unacceptable shall be corrected by the Contractor, at no additional cost.
- b. The Contractor shall be responsible for payment of all fees associated with inspections, permits and utility connections unless otherwise indicated.

4. ELECTRICAL

- a. For equipment provided under this Division of the Specification requiring electrical connection, the Electrical Contractor will extend wiring thereto and make proper connections to the extent shown or referenced by the Drawings and/or Specifications.
- b. All electrical equipment furnished under this division of the Specifications shall conform to the applicable requirements of Division <u>26 ELECTRICAL</u>
- c. Verify voltage and phase characteristics of the electrical service and coordinate with mechanical equipment as required.

5. SHOP DRAWINGS AND SUBMITTALS

- a. Provide all submittals as called for in the Specifications including shop drawings, samples, material lists, Schedule of Value, etc. SHOP DRAWINGS SHALL BE COMPLETELY REVIEWED AND APPROVED BY THE CONTRACTOR AND TRADE FURNISHING THE EQUIPMENT (INDICATED BY THE CONTRACTORS APPROVAL STAMP) PRIOR TO SUBMITTING TO THE ARCHITECT.
- b. Provide shop drawings for all items of Mechanical Equipment.
 - 1) Each copy as called for shall be identical. Quantity of original color samples required shall be coordinated with the Architect.
- c. Review and approval of shop drawings by the Architect is for general conformity to design intent only.
 - 1) This review does not authorize changes to the contract sum or relieve the Contractor in any way of his contract obligations.

6. RECORD DRAWINGS

- a. Maintain accurate records of all changes made during construction.
 - 1) Provide a neatly marked set of prints to the Architect at completion of the project indicating all field changes.
 - 2) Contractor shall save one set of prints for this purpose in order to neatly coordinate and transfer all marks made on field sets.

7. WORKMANSHIP

a. Install all materials and equipment in accordance with the manufacturer's recommendations, as approved by the Architect to conform with the Contract Documents.

8. OPERATING AND MAINTENANCE MANUALS AND INSTRUCTION

- a. Provide one (1) hard copy and one (1) electronic copy (PDF) of complete Installation, Operating, and Maintenance Instructions.
 - Manuals shall also include complete parts lists, operating instructions, copies of original shop drawings, Subcontractor Lists, Warranties, Warnings, etc. Generic instructions shall highlight applicable sections when needed to differentiate from non-relevant equipment.
- b. Turn over to Owner all tools supplied with equipment.
 - 1) Mark each item and identify use and function.

9. GUARANTEES AND WARRANTIES

- a. All labor, materials and equipment shall be guaranteed by the Contractor and warranted by the manufacturer for a period of one year from the date of Substantial Completion, unless longer period is specified for specific equipment.
- b. The Contractor shall make all necessary repairs, alterations and system adjustments during the guarantee period as may be required by the Owner or Architect for correct system operation and to comply with the Drawings and Specifications.
 - 1) These repairs and alterations shall be at no additional cost to the Owner.

10. PENETRATIONS

- a. Provide fire and fire/smoke dampers as shown on the Drawings at fire-rated wall and floor penetrations.
 - 1) Seal perimeter of new fire dampers with firestopping sealant.
- b. At all hydronic piping penetrations through fire-rated walls, provide elastomeric sealant between pipe and wall to allow for movement.
- c. Provide UL-approved firestopping assemblies at all new piping penetrations.
 - 1) Submit assembly drawings for Architect's review and approval.

11. PAINTING

- a. All fans, motors and equipment shall be factory prime coated except as otherwise specified.
- b. All finish painting shall match the existing conditions where existing equipment has been removed or where new exposed conduit or piping is installed.
- c. Provide one (1) coat of flat black enamel on duct interior where inside of duct is visible through grille.
- d. Mechanical Trade shall protect all motors, chrome plating, equipment name tags, bearings, valve stems, gauge glasses and other appurtenances to which painting would be detrimental.
- e. Removable cores for grilles shall not be installed until completion of all painting in area.

12. LUBRICATION

- a. All new mechanical equipment shall be properly lubricated prior to any operation or testing.
- b. Lubricants shall be of types approved for particular application by equipment supplier.
- c. Equipment shall be re-lubricated at time of Substantial Completion.
- d. Where motors or bearings are located inside of equipment, provide grease extensions to exterior of equipment and access door to allow visual inspection of bearing during greasing.

13. PROTECTION

- a. Contractor shall be responsible for work and equipment until finally inspected, tested, approved and turned over to Owner.
- b. After delivery, and before and after installation, protect work against theft, injury or damage.
- c. Carefully store material and equipment received on site which are not immediately installed.
- d. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.
- e. Any extra cost caused by loss or damage to equipment or systems shall be borne by the Contractor.

14. ACCESSIBILITY

- a. Arrange all work for maximum accessibility for operation, maintenance and repair.
 - 1) Also install clear of windows, doors and other openings.
 - 2) Maintain maximum headroom.
- b. Provide access panels as previously specified at all equipment, valves, dampers, fire dampers, controls, etc., where concealed in walls or above inaccessible ceilings. Minimum 12" x 12" or as required for full servicing of equipment.
 - 1) Turn over to appropriate General Trade for installation.
 - Coordinate exact placement and size needed for each condition. Engineer/Architect to approve all access panel installations not noted on Drawings but required for access.

15. FILTERS

- a. Furnish temporary "throw-away" filters as required during construction for air handling equipment.
- b. At completion provide new final filters as specified for equipment.
- c. Check and replace filters on a regular basis.

- d. Do not operate air handling equipment when any dust generating operations are taking place without specific permission from the Architect.
- e. Assure that all coils, fans, ducts, etc. are clean at the completion of the project.

23 06 50 - VRF HVAC SYSTEMS

- A. GENERAL
 - 1. SCOPE
 - a. The R2-Series system shall consist of a PURY outdoor unit, BC (Branch Circuit) Controller, multiple indoor units, and M-NET DDC (Direct Digital Controls).
 - 1) Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups.
 - 2) System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation.
 - 3) To ensure owner comfort, each indoor unit or group of indoor units shall be independently controlled and capable of changing mode automatically when zone temperature strays 1.8° F from set point for ten minutes.
 - 4) The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of outdoor rated capacity.

2. QUALITY ASSURANCE

- a. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL Label.
- b. All wiring shall be in accordance with the National Electrical Code (NEC).
- c. The units shall be rated in accordance with the Air-conditioning, Heating, and Refrigeration Institute's (AHRI) Standard 240 and bear the AHRI Certification Label.
- d. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
- e. A dry air holding charge shall be provided in the indoor section. A full charge of R410A shall be provided in the outdoor unit.
- f. <u>Delivery, Storage and Handling</u>:
 - 1) Unit shall be stored and handled according to the manufacturer's recommendations.
 - 2) The hand held wireless controller shall be shipped inside the carton with the indoor unit and able to withstand 105° F storage temperatures and 95% relative humidity without adverse effect.

3. WARRANTY

- a. The units shall have a manufacturer's parts and defects warranty for a period of five (5) years from date of installation.
- b. The compressor shall have a warranty of seven (7) years from the same date of installation.
 - 1) If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer.

2) This warranty does not include labor.

B. MATERIALS

- 1. BASIS OF DESIGN
 - a. For the purpose of establishing the level of performance and quality of products desired, products manufactured by Mitsubishi Electric, Inc. have been specified.
 1) See Mechanical Drawings.
 - b. Products by other manufacturers which meet or exceed the requirements of the Drawings and Specifications may be submitted to the Architect for review and approval.

2. INDOOR UNIT (WALL-MOUNTED TYPE)

- a. <u>General:</u>
 - 1) The indoor unit shall be factory assembled, wire and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board, fan and fan motor.
 - 2) The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function after power interruption.
 - 3) Indoor unit shall be purged with dry air before shipment from factory.
- b. <u>Unit Cabinet</u>:
 - 1) Wall-mounted unit casing shall have a smooth front, white finish.
 - 2) Multi directional drain connection and refrigerant piping, offering 3direction pipe alignments for all refrigerant piping and 2-direction pipe alignments for condensate draining shall be standard.
 - 3) There shall be a separate, metal installation-plate that secures the indoor unit firmly to the wall.
 - a) The installation-plate shall be securely attached to the wall using appropriate anchor method.
 - b) Installing contractor shall determine the best method and be responsible for proper mounting of the installation plate to the wall.
- c. <u>Fan:</u>
 - 1) The indoor unit fan shall be an assembly with a line-flow fan direct driven by a single motor.
 - 2) The fan shall be statically and dynamically balanced and be powered by a motor with permanently lubricated bearing.
 - 3) A manual adjustable guide vanes shall be provided with the ability to change the airflow from side to side (left to right).
 - 4) At wall-mounted units, an integral, motorized, multi-position, horizontal air sweep flow louver shall provide for uniform air distribution, up and down.
 - a) Five (5) positions plus Auto and Swing shall be provided, controlled from the remote controller.
- d. <u>Filter:</u>
 - 1) Return air shall be filtered by means of easily removed, washable, Catechin.
 - 2) Antioxidant Pre-filter and Anti-allergy enzyme filter blue, pleated type.

- e. <u>Coil</u>:
 - 1) The indoor unit coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner groves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A sloped, corrosion resistant condensate pan with drain shall be provided under the coil.
 - 6) An optional drain pan level switch (DPLS1), designed to connect the control board, shall be provided if required, and installed on the condensate pan to prevent condensate from overflowing.
- f. <u>Electrical</u>:
 - 1) The unit electrical power shall be 208-230 volts, 1-phase, 60 hertz.
 - 2) The indoor unit shall not have any supplemental electrical heat elements.
- g. <u>Control</u>:
 - 1) The unit shall have a wireless hand-held remote controller to perform input functions necessary to operate the system.
 - 2) The wireless hand-held controller shall have a Power On/Off switch, Mode Selector - Auto, Cool, Heat, Dry Modes - Temperature Setting, Timer Control with Clock, Fan Speed Select and Vane / Airflow Direction selector.
 - a) Controller shall have a programmable Smart Set button for preselected temperature, fan speed, and Vane position settings.
 - 3) The indoor unit shall perform Self-diagnostic Function and Check Mode switching.
 - 4) Temperature changes shall be by 1^oF increments with a range of 61 88^oF (16-31^oC).
 - 5) The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or a wired controller, providing emergency operation and controlling the outdoor unit.
 - 6) The system shall be capable of automatically restarting and operating at the previously selected conditions when the power is restored after power interruption.
 - 7) Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off, System/Mode function.
 - 8) The indoor unit shall have the option of either a wireless or wired wall mounted remote controller to be ordered separately.

3. INDOOR UNITS (CEILING CASSETTE TYPE)

- a. <u>General</u>:
 - 1) The unit shall be a one-way cassette style indoor unit that recesses into the ceiling with a ceiling grille.
 - 2) The indoor unit shall be factory assembled, wired and run tested.
 - 3) Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor.
 - 4) The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch.

- 5) Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
- b. <u>Unit Cabinet</u>:
 - 1) The cabinet shall be a compact 22-7/16" wide x 22-7/16" deep so it will fit within a standard 24" square suspended ceiling grid.
 - 2) The cabinet panel shall have provisions for a field installed filtered outside air intake.
 - 3) One-way grille shall be fixed to bottom of cabinet allowing one-way air flow.
- c. <u>Fan</u>:
 - 1) The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of three (3) speeds, Low, Mid, and High.
- d. <u>Filter</u>: Return air shall be filtered by means of a long-life washable filter.
- e. <u>Coil</u>:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 19-3/4" above the condensate pan.
- f. <u>Electrical</u>:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz).
- g. <u>Controls</u>:
 - 1) This unit shall use controls provided by the unit manufacturer to perform functions necessary to operate the system.
 - 2) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode.
 - a) Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
 - 3) Control board shall include contacts for control of external heat source.
 - a) External heat may be energized as second stage with 1.8°F-9.0°F adjustable deadband from set point.
 - 4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
 - 5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
- 4. VERTICAL AIR HANDLERS (INDOOR UNITS)
 - a. <u>General</u>:

- 1) The unit shall be a multi-position indoor fan coil design with a fixed bottom return, a fixed vertical discharge supply, and a modulating linear expansion device.
- 2) The unit shall have the capability to be mounted in either the vertical or horizontal (left or right) and have the capability to integrate into systems with various types of indoor units connected.
- 3) The unit shall be used with the Y-Series outdoor unit and shall support individual control using M-NET DDC controllers.
- 4) Units shall have the ability to control supplemental heat or humidifier via a control board connector and a 12 VDC output.
- 5) Units shall have ability to output fan speed via a relay kit.
- 6) The unit shall be suitable for use in air handling spaces in accordance with Section 18.2 of UL 1995 4th Edition.
- 7) The unit shall be tested in accordance with ANSI/ASHRAE 193 and have less than 2% air leakage at maximum airflow setting.
- b. Indoor Unit:
 - 1) The indoor unit shall be factory assembled, wired and run tested.
 - 2) Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor.
 - 3) The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function.
 - 4) Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
- c. <u>Unit Cabinet</u>: The cabinet shall be pre-painted, pre-insulated, 22-gauge galvanized steel.
- d. <u>Fan</u>:
 - 1) The indoor unit fan shall be an assembly with a single direct drive fan with a high efficiency DC motor.
 - 2) The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
 - 3) The indoor unit shall have a ducted air outlet system and ducted return air system.
 - 4) The fan shall have 3-speeds with the capability to operate between 0.3-0.8 In.W.G. selectable.
- e. <u>Filter</u>: The unit shall have a 1" filter rack with a reusable filter.
- f. <u>Coil</u>:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) The condensate shall be gravity drained from the fan coil.
 - 7) Both refrigerant lines to the indoor units shall be insulated in accordance with the installation manual.
- g. <u>Electrical</u>:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

- 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz).
- h. <u>Controls</u>: This unit shall use controls specified to perform functions necessary to operate the system.

5. INDOOR UNITS (FLOOR-MOUNTED TYPE, EXPOSED OR CONCEALED)

- a. <u>General</u>:
 - 1) The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor.
 - 2) The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch.
 - 3) Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
- b. <u>Unit Cabinet (Exposed)</u>: The casing shall have a beige acrylic paint finish.
- c. <u>Unit Cabinet (Recessed)</u>: The casing shall have a galvanized sheet metal finish.
- d. <u>Fan</u>:
 - 1) The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of two (2) speeds, High and Low.
- e. <u>Filter</u>: Return air shall be filtered by means of an easily removable washable filter.
- f. <u>Coil</u>:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) Both refrigerant lines to the floor-mounted indoor units shall be insulated in accordance with the installation manual.
- g. <u>Electrical</u>:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz).
- h. <u>Controls</u>:
 - 1) This unit shall use controls provided by the manufacturer to perform functions necessary to operate the system.
 - Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F-9.0°F adjustable dead band from set point.
 - 3) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies. Indoor unit shall include

no less than three (3) digital outputs capable of being used for customizable control strategies.

6. INDOOR UNITS(CEILING-SUSPENDED)

- a. <u>General</u>:
 - 1) The ceiling-suspended indoor unit section shall have a modulating linear expansion device.
 - 2) The unit shall be used with the R2-Series outdoor unit and BC Controller(s), Y-Series outdoor unit, or S-Series outdoor unit.
 - 3) The PCFY shall support individual control using M-NET DDC controllers.
- 7. INDOOR UNIT
 - a. The indoor unit shall be factory assembled, wired and run tested.
 - b. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor.
 - c. The unit shall have a self-diagnostic function, 3 minute time delay mechanism, an auto restart function, and a test run switch.
 - d. The unit shall have an auto-swing function for the horizontal vane.
 - e. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
- 8. UNIT CABINET
 - a. The casing shall have a white finish.
 - b. <u>Fan</u>:
 - The indoor unit fan shall be an assembly with two (2), three (3), or four
 (4) Sirocco fan(s) direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of four (4) speeds, Low, Mid1, Mid2, and High, and Auto fan function.
 - c. <u>Filter</u>:
 - 1) Return air shall be filtered by means of an easily removable, washable filter.
 - d. <u>Coil</u>:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) Both refrigerant lines to the PCFY indoor units shall be insulated in accordance with the installation manual.
 - e. <u>Electrical</u>:

- 1) The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
- 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz)
- f. <u>Controls</u>:
 - 1) This unit shall use controls provided by the manufacturer to perform functions necessary to operate the system.
 - a) Please refer to Part 5 of this guide specification for details on controllers and other control options.
 - 2) Units shall have the ability to control supplemental heat via connector CN24 and a 12 VDC output
 - 3) Control board shall include contacts for control of external heat source.
 - a) External heat may be energized as second stage with 1.8°F
 9.0°F adjustable deadband from set point.
 - 4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
 - 5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
 - 6) Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery.
 - a) Sensor shall require no external power for operation and shall have an audible indication of low battery condition.
 - 7) The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan.
 - a) Should this occur the control shuts down the indoor unit before an overflow can occur.
 - b) A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.
- 9. BRANCH CIRCUIT CONTROLLER FOR R2-SERIES SYSTEMS
 - a. <u>General</u>:
 - 1) The BC (Branch Circuit) Controllers shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling.
 - 2) Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices with no subcooling risk bubbles in liquid supplied to LEV and are not allowed.
 - 3) The BC (Branch Circuit) Controllers shall be specifically used with R410A R2-Series systems.
 - a) These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation.
 - b) The unit shall have a galvanized steel finish.
 - c) The BC Controller shall be completely factory assembled, piped and wired.
 - d) Each unit shall be run tested at the factory.
 - e) This unit shall be mounted indoors, with access and service clearance provided for each controller.
 - f) The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of rated capacity.

- g) The BC Controller shall be suitable for use in plenums in accordance with UL1995 ed 4.
- b. <u>BC Unit Cabinet</u>:
 - 1) The casing shall be fabricated of galvanized steel.
 - 2) Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.
 - 3) The unit shall house two (2) tube-in-tube heat exchangers.
- c. <u>Refrigerant</u>:
 - 1) R410A refrigerant shall be required.
- d. <u>Refrigerant Branches</u>:
 - 1) All BC Controller refrigerant pipe connections shall be brazed or flared.
- e. <u>Refrigerant Valves</u>:
 - 1) The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH and up to three (3) indoor units.
 - 2) Branches may be twinned to allow more than 54,000 BTUH.
 - a) Each branch shall have multiple two-position valves to control refrigerant flow.
 - Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.
 - 4) Linear electronic expansion valves shall be used to control the variable refrigerant flow.
- f. Integral Drain Pan:
 - 1) An Integral resin drain pan and drain shall be provided
- g. <u>Electrical</u>:
 - 1) The unit electrical power shall be 208/230 volts, 1 phase, 60 Hertz.
 - 2) The unit shall be capable of satisfactory operation within voltage limits of 187-228 (208V/60Hz) or 207-253 (230/60Hz).
 - 3) The BC Controller shall be controlled by integral microprocessors
 - 4) The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

10. OUTDOOR UNITS

- a. <u>General</u>:
 - 1) The outdoor units must have a thermally fused powder coated finish.
 - 2) The outdoor unit shall be completely factory assembled, piped and wired.
 - 3) Each unit shall be run tested at the factory.
- b. Outdoor unit shall have sound rating no higher than 60 dB(A) with 50 dB(A) limit while in night mode.

- c. The outdoor unit shall be capable of operating in cooling mode down to -10°F with optional manufacturer-supplied low ambient kit.
- d. Manufacturer-supplied low ambient kit shall be provided with predesigned control box rated for outdoor installation and capable of controlling kit operation automatically in all outdoor unit operation modes.
- e. Manufacturer-supplied low ambient kit shall be listed by Electrical Laboratories (ETL) and bear the ETL label.
- f. Manufacturer-supplied low ambient kit shall be factory tested in low ambient temperature chamber to ensure operation.
 - 1) Factory performance testing data shall be available when requested.
- g. The outdoor unit shall be provided with a manufacturer-supplied, 20-gauge, hot dipped, galvanized snow/hail guard, the snow/hail guard protects the outdoor coil surfaces from hail damage and snow buildup in severe climates.
- h. The outdoor unit shall have a high-efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.
- i. <u>Unit Cabinet (Y-Series)</u>:
 - 1) The casing(s) shall be fabricated of galvanized steel, bonderized and finished.
 - a) Unit cabinets shall be able to withstand 960 hours per ASTM B117 criteria for seacoast protected models (-BS models).
 - 2) <u>Fan</u>:
 - a) Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan.
 - b) The fan motor shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
 - (i) The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch.
 - c) The fan motor shall be mounted for quiet operation.
 - d) The fan shall be provided with a raised guard to prevent contact with moving parts.
 - e) The outdoor unit shall have vertical discharge airflow.
 - 3) <u>Refrigerant</u>:
 - a) R410A refrigerant shall be required for Y-Series outdoor unit systems.
 - b) Polyolester (POE) oil shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic

properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two (2) weeks prior to bidding.

- 4) <u>Coil</u>:
 - a) The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
 - b) The coil fins shall have a factory applied corrosion resistant blue-fin finish.
 - c) The coil shall be protected with an integral metal guard.

- d) Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.
- e) The outdoor coil shall include four (4) circuits with two (2) position valves for each circuit, except for the last stage.
- 5) <u>Compressor</u>:
 - a) Each outdoor unit module shall be equipped with one (1) inverter driven scroll hermetic compressor.
 - (i) Non inverter-driven compressors, which cause inrush current (demand charges) and require larger wire sizing, shall not be allowed.
 - b) A crankcase heater(s) shall be factory mounted on the compressor(s).
 - c) The outdoor unit compressor shall have an inverter to modulate capacity.
 - (i) The capacity shall be completely variable with a turndown of 18-4% of rated capacity, depending upon unit size.
 - d) The compressor shall be equipped with an internal thermal overload.
 - e) The compressor shall be mounted to avoid the transmission of vibration.
- 6) <u>Electrical</u>:
 - a) The outdoor unit electrical power shall be 208/230 volts, 3phase, 60 hertz.
 - b) The outdoor unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz).
 - c) The outdoor unit shall be controlled by integral microprocessors.
 - d) The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

11. CONTROLS

- a. The control system shall consist of a low voltage communication network of unitary built-in controllers with on-board communications and a web-based operator interface.
- b. A web controller with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network.
- c. Operators shall be able to perform all normal operator functions through the web browser interface.
- d. System controls and control components shall be installed in accordance with the manufacturer's written installation instructions.
- e. Furnish energy conservation features such as optimal start, night setback, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

- f. System shall provide direct and reverse-acting on and off algorithms based on an input condition or group conditions to cycle a binary output or multiple binary outputs.
- g. Provide capability for future system expansion to include monitoring and use of occupant card access, lighting control and general equipment control.
- h. System shall be capable of email generation for remote alarm annunciation.
- i. Control system start-up shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in Mitsubishi Electric controls system configuration and operation.
 - 1) The representative shall provide proof of certification for Mitsubishi Electric Controls Applications Training indicating successful completion of no more than 2 years prior to system installation.
 - a) This certification shall be included as part of the equipment and/or controls submittals.
 - b) This service shall be equipment and system count dependent and shall be a minimum of one (1) 8-hour period to be completed during normal working hours.

C. INSTALLATION

1. ROOF MOUNTED OUTSIDE UNITS

- a. Roof Mounted outside units shall be supported 12" above the roof level on anchor rails.
 - 1) Anchor unit to rails with stainless steel fasteners.

2. REFRIGERANT LINES

a. Refrigerant lines shall be insulated for their entire length, including portions within the indoor unit cabinet.

23 21 13 - HYDRONIC PIPING

A. GENERAL

- 1. SCOPE
 - a. This section includes pipe and pipe fittings, valves, and insulation, required as part of the heating water piping system.
- 2. REGULATORY REQUIREMENTS
 - a. Conform to ANSI/ASME B31.9.
- 3. QUALITY ASSURANCE
 - a. <u>Valves</u>: Manufacturer's name and pressure rating marked on valve body.
 - b. <u>Welding Materials and Procedures</u>: Conform to ANSI/ASME SEC 9.
 - c. <u>Welders Certification</u>: In accordance with ANSI/ASME SEC 9.
- 4. SUBMITTALS
 - a. Submit product data under provisions of Section <u>00 73 00 SUPPLEMENTARY</u> <u>CONDITIONS</u>.
 - 1) Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2) Include welders certification of compliance with ANSI/ASME SEC 9.
- 5. JOB REQUIREMENTS
 - a. All hydronic piping shall be insulated in accordance with this section.

B. MATERIALS

- 1. CHILLED WATER, HEATING WATER AND DUCT TEMPERATURE WATER PIPING (ABOVE GROUND)
 - a. <u>Steel Pipe</u>: ASTM A53 or A120, Schedule 40, 0.375" wall for sizes 12" and over, black.
 - 1) <u>Fittings</u>: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.
 - 2) <u>Joints</u>: Screwed.
 - b. <u>Piping 2" or Smaller (Either)</u>:
 - 1) <u>Copper</u>: Shall by type L with soldered fittings and joints.
 - a) Fittings shall be:
 - (i) Wrought copper solder joint fittings, ASTM B61, ANSI B16.22.
 - (ii) <u>Press Fittings</u>: Copper and copper alloy press fittings shall conform to material requirements of SME B16.18 or ASME B16.22 and performance criteria of IAPMO Ps 117.

- (aa) Sealing elements for press fittings shall be EPDM.
- (bb) Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer.
- 2. EQUIPMENT DRAINS AND OVERFLOWS
 - a. <u>Copper Tubing</u>: ASTM B88, Type L, hard drawn.
 - 1) <u>Fittings</u>: ANSI/ASME B16.23 cast brass, or ANSI/ASME B16.29 solder wrought copper.
 - 2) <u>Joints</u>: ASTM B32, solder, Grade 95TA.
 - b. PVC Pipe: Schedule 40. DWV pipe and fittings. ASTM1785 and ASTM D2467.
- 3. FLANGES, UNIONS AND COUPLINGS
 - a. <u>Pipe Size 2" and Under</u>: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
 - b. <u>Pipe Size over 2"</u>: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; 1/16" thick preformed neoprene bonded to asbestos.
- 4. GLOBE VALVES
 - a. Shall be as manufactured by:
 - 1) Milwaukee Valve Co.
 - 2) Stockham Co.
 - 3) NIBCO
 - 4) Or as approved by Architect.
 - b. <u>Up to 2"</u>: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, solder or screwed ends, with backseating capacity.
 - c. <u>Over 2"</u>: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.
- 5. BALL VALVES
 - a. Shall be as manufactured by:
 - 1) Milwaukee Valve Co.
 - 2) Demco Valve Co.
 - 3) NIBCO
 - 4) Or approved by Architect.
 - b. <u>Up to 2"</u>: Bronze one piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends.
 - c. <u>Over 2"</u>: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle.
- 6. PLUG COCKS
 - a. <u>Up to 2"</u>: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, with one wrench operator for every ten plug cocks.

- b. <u>Over 2"</u>: Cast iron body and plug, pressure lubricated, Teflon packing, flanged ends, with wrench operator with set screw.
- 7. SWING CHECK VALVES
 - a. Shall be as manufactured by:
 - 1) Milwaukee Valve Co.
 - 2) Stockham Co
 - 3) Or Architect approved equal.
 - b. Up to 2": Bronze 45° swing disc, solder or screwed ends.
 - c. <u>Over 2"</u>: Iron body, bronze trim, 45° swing disc, renewable disc and seat, flanged ends.
- 8. SPRING LOADED CHECK VALVES
 - a. Shall be iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends as manufactured by:
 - 1) Milwaukee Valve Co.
 - 2) Stockham Co.
 - 3) Or Architect approved equal.
- 9. RELIEF VALVES
 - a. <u>Shall be</u>:
 - 1) Bronze Body.
 - 2) Teflon Seat.
 - 3) Stainless steel stem and springs.
 - 4) Automatic direct pressure actuated.
 - 5) Capacities ASME certified and labeled as manufactured by:
 - a) Watts Regulator Co.
 - b) Kunkle Valve Co.
- 10. INSULATION
 - a. Shall be fiberglass jacketed units by:
 - 1) Johns Manville.
 - (i) 3/8" closed cell foam, flexible insulation.
 - 2) Rubatex.
 - 3) Or Architect approved equal
 - b. Provide insulation thickness per the following schedule:
 - 1) 1/2 2" runouts to individual pieces of equipment 1/2" Rubatex or 3/4" Fiberglass
 - 2) 1-1/2" or less 1" Fiberglass.
 - 3) Larger than 1-1/2" 2" Fiberglass.
 - c. Where fiberglass insulation is utilized, provide vapor dams at the end of each piece of insulation and as noted on the Drawings.
- 11. COMBINATION SHUTOFF VALVE WITH INTEGRAL BOILER DRAIN AND STRAINER
 - a. Valves shall have brass body with full port chrome-plated ball, ball seal, PTFE.

Include 3/4" FNPT drain outlet with 1/4 turn valve and cap. Zylem model UBY or equal.

- 1) Include integral strainer with stainless steel filter material.
- 12. COMBINATION BALANCING AND SHUTOFF VALVES
 - a. Valves shall have brass body and chrome-plated brass ball with glass and carbon-fitted PTFE seating rings.
 - Maximum operating pressure of 300 psi and operating range of -4°F to 250°F. Zylem model 300 or equal.

C. EXECUTION

- 1. PREPARATION
 - a. Ream pipe and tube ends.
 - b. Remove burrs.
 - c. Bevel plain end ferrous pipe.
 - d. Remove scale and direct on inside and outside before assembly.
 - e. Prepare piping connections to equipment with flanges or unions.
 - f. After completion, fill, clean, and treat systems.

2. INSTALLATION

- a. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- b. Install piping to conserve building space, and not interfere with use of space and other work.
- c. Group piping whenever practical at common elevations.
- d. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- e. Provide access where valves and fittings are not exposed.
- f. Slope piping and arrange systems to drain at low points.a) Use eccentric reducers to maintain top of pipe level.
- g. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- h. Prepare pipe, fittings, supports, and accessories for finish painting and/or to receive insulation.
 - 1) Refer to Section <u>09 91 00 PAINTING</u>.
- i. Install valves with stems upright or horizontal, not inverted.

3. APPLICATION

- a. Use grooved mechanical couplings and fasteners only in accessible locations.
- b. Install unions downstream of valves and at equipment or apparatus connections.
- c. Install brass male adapters each side of valves in copper piped system.
 1) Sweat solder adapters to pipe.
- d. Install gate or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- e. Install ball or butterfly valves for throttling, bypass, or manual flow control services.
- f. Use plug cocks for throttling service.
 - 1) Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.
- g. Use butterfly valves interchangeably with gate and globe valves.
- h. Use lug end butterfly valves to isolate equipment.
- i. Provide 3/4" gate or ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
 - 1) Pipe to nearest drain.

23 21 16 - HYDRONIC SPECIALTIES

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing all materials, labor and tools to install expansion tanks, air vents, air separators, strainers, pump suction fittings, combination fittings, flow indicators, controls, meters, radiator valves, and relief valves as required for a complete system.

2. RELATED SECTIONS

- a. Refer to Section <u>23 21 13 HYDRONIC PIPING</u> for related work.
- 3. REGULATORY REQUIREMENTS
 - a. Conform to ANSI/ASME Boilers and Pressure Vessels Code Section 8D for manufacturer of tanks.
- 4. QUALITY ASSURANCE
 - a. For each product specified, provide components by same manufacturer throughout.
- 5. SUBMITTALS
 - a. Submit shop drawings and product data for manufactured products and assemblies required for this project. Include the following:
 - 1) Component Sizes.
 - 2) Rough-in Requirements.
 - 3) Service Sizes.
 - 4) Finishes.
 - 5) Product Description. Include the following:
 - a) Model
 - b) Dimensions.
 - b. Submit inspection certificates for pressure vessels from authority having jurisdiction.
 - c. Submit manufacturer's installation instructions under provisions of <u>Section 23 05</u> 00 MECHANICAL GENERAL REQUIREMENTS.
- 6. OPERATION AND MAINTENANCE DATA
 - a. Submit operation and maintenance data under provisions of Section <u>23 05 00</u> <u>MECHANICAL GENERAL REQUIREMENTS</u> which include installation instruction, assembly views, lubrication instructions, and replacement parts list.

B. MATERIALS

- 1. EXPANSION TANKS
 - a. Shall be closed, welded steel, tested and stamped in accordance with Section 8D of ANSI/ASME Code; 150 psi rating; cleaned, prime coated, and supplied

with steel support saddles; with tappings for installation of accessories as manufactured by one of the following:

- 1) Amtrol, Bell & Gossett
- 2) Taco
- 3) Or Architect approved equal.
- b. <u>Gage Glass Set</u>: Brass compression stops, guard, and 3/4" glass, maximum 24" length, long enough to cover tank for 2" above bottom to 2" below top.
- c. Quick Connect Air Inlet:
 - 1) Automotive tire valve type.
 - 2) Manual Air Vent.
 - 3) Tank Drain.
 - 4) Pressure Relief Valve.

d. <u>Automatic Cold Water Fill Assembly</u>:

- 1) Pressure Reducing Valve.
- 2) Reduced Pressure Double Check Back Flow Preventer
- 3) Test Cocks.
- 4) Strainer.
- 5) Vacuum Breaker
- 6) Valved By-pass.
- 2. AIR VENTS
 - a. <u>Air Vents</u>:
 - 1) <u>Manual Type</u>: Short vertical sections of 2" (50mm) diameter pipe to form air chamber, with 1/8" (3mm) brass needle valve at top of chamber.
 - 2) <u>Washer Type</u>: Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring-loaded ball check valve.

3. AIR SEPARATORS/HYDRONIC SEPARATOR

- a. <u>Manufacturer</u>:
 - 1) Spirotherm.
 - 2) Or Architect approved equal.
- b. <u>Operating Pressure</u>: Shall be 150 psi.
- c. <u>Dip Tube Fitting</u>: To prevent free air collected in boiler from rising into system.
- d. <u>In-Line Air Separators</u>: Steel body; tested and stamped in accordance with Section 8D of ANSI/ASME Code.
- e. <u>Air Elimination Valve</u>: Bronze, float operated.
- 4. STRAINERS
 - a. <u>Manufacturer</u>:
 - 1) Armstrong.
 - 2) Metraflex Co.
 - 3) Sterling.
 - 4) Or Architect approved equal.

- b. <u>Size 2" and Under</u>: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32" stainless steel perforated screen.
- c. <u>Size 21/2" to 4"</u>: Flanged iron body for 175 psig working pressure, Y pattern with 3/64" stainless steel perforated screen.
- d. <u>Size 5" and Larger</u>: Flanged iron body for 175 psig working pressure, basket pattern with 1/8" stainless steel perforated screen.
- 5. PUMP SUCTION FITTINGS
 - a. Shall be angle pattern, cast-iron body, threaded for 2" and smaller, flanged for 2½" and larger, rated for 175 psig working pressure, with inlet vanes, cylinder strainer with 3/16" diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning as manufactured by one of the following:
 - 1) Bell & Gossett
 - 2) Taco
 - 3) Thrush
 - b. <u>Accessories</u>:
 - 1) Adjustable Foot Support.
 - 2) Blowdown Tapping in Bottom.
 - 3) Gage Tapping in Side.

6. COMBINATION PUMP DISCHARGE VALVES

- a. <u>Valves</u>: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psig operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.
- 7. FLOW CONTROLS
 - a. Shall be brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet as manufactured by one of the following:
 - 1) Honeywell, Bell & Gossett.
 - 2) Taco
 - 3) Or Architect approved equal.
 - b. Zone valves to include removable head with 18" lead wire.
 - 1) Unit flow control (zone) valves to be:
 - a) Honeywell V8043G1018 with 3/4" sweat connections.
 - b) Or Architect approved equal.
 - c. <u>Calibration</u>: Control flow within 5% of selected rating, over operating pressure range of ten (10) times minimum pressure required for control, maximum minimum pressure 3.5 psig.
 - d. <u>Control Mechanism</u>: Stainless steel or nickel-plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.
 - e. <u>Accessories</u>:
 - 1) In-line Strainer on Inlet.
 - 2) Ball Valve on Outlet.

8. RELIEF VALVES

- a. Shall be bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled as manufactured by one of the following:
 - 1) Watts Regulator Co.
 - 2) Kunkle Valve Co.
 - 3) Or Architect approved equal.

C. EXECUTION

- 1. INSTALLATION AND APPLICATION
 - a. Install specialties in accordance with manufacturer's instructions to permit intended performance.
 - b. <u>Expansion Tanks</u>:
 - 1) Support tanks inside building from building structure.
 - 2) Where large air quantities can accumulate, provide enlarged air collection standpipes.
 - c. <u>Air Vents and Separators</u>:
 - 1) Provide manual air vents at system high points and as indicated.
 - 2) For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
 - 3) Provide air separator on suction side of system circulation pump and connect to expansion tank.
 - d. <u>Strainer</u>: Provide valved drain and hose connection on strainer blow down connection.
- 2. FLOW CONTROLS
 - a. <u>Pump Suction Fittings and Discharge Valves</u>:
 - 1) Provide pump suction fitting on suction side of pumps.
 - 2) Remove temporary strainers after cleaning systems.
 - b. <u>Relief Valves</u>:
 - 1) Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
 - a) Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity.
 - b) Select equipment relief valve capacity to exceed rating of connected equipment.
 - c) Pipe relief valve outlet to nearest floor drain.
 - 2) Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

23 21 23 - HYDRONIC PUMPS

A. GENERAL

1. SCOPE

a. This section includes furnishing all material, labor and tools to install in-line circulators as shown on the drawings.

2. QUALITY ASSURANCE

a. Company specializing in manufacture assembly, and field performance of pumps with minimum three (3) years experience.

3. SUBMITTALS

- a. Submit shop drawings and product data with certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- b. Submit manufacturer's installation instructions.
- 4. OPERATION AND MAINTENANCE DATE
 - a. Submit operation and maintenance data under provisions of Section <u>23 05 00</u> <u>MECHANICAL GENERAL REQUIREMENTS.</u>
 - b. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

B. MATERIALS

- 1. PUMPS
 - a. Shall be as manufactured by:
 - 1) Wilo, Bell & Gossett.
 - 2) Taco.
 - 3) Thrush
 - 4) Or Architect approved equal.
 - b. Pumps shall be as scheduled on the drawings.
 - c. Balance pump rotating parts, statically and dynamically.
 - d. Construct to permit connections to be flanged, servicing without breaking piping or motor connections.
- 2. IN-LINE CIRCULATORS
 - a. <u>Type</u>:
 - 1) Horizontal Shaft.
 - 2) Single Stage.
 - 3) Direct Connected.
 - a) Resiliently mounted motor for in-line mounting.

4)Permanently lubricated, for 145 psig maximum working pressure.

- b. <u>Casing</u>: Cast iron, cataphoresis coated.
- c. <u>Impeller</u>: Fiberglass reinforced PP.
- d. <u>Bearings</u>: Metal impregnated carbon.
- e. <u>Shaft</u>: Stainless steel with stainless steel sleeve, integral thrust collar.
- f. <u>Seal</u>: Carbon rotating against a stationary ceramic seat 225F maximum continuous operating temperature.

C. INSTALLATION

- 1. Install pumps in accordance with manufacturer's instructions.
- 2. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- 3. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25% of midpoint of published maximum efficiency curve.
- 4. Decrease from line size with long radius reducing elbows or reducers.
 - 1) Support piping adjacent to pump such that no weight is carried on pump casings.
- 5. Provide line sized shut-off valve and strainer on pump suction, and line sized combination pump discharge valve on pump discharge.
- 6. Lubricate pumps before start-up.
23 25 00 - CONDENSING HIGH EFFICIENCY GAS BOILERS

A. GENERAL

1. SCOPE

a. This section includes boilers, controls and boiler trim, indoor/outdoor controller, hot water connections, fuel-burning system and connection, and vent/flue connection as required for a complete system.

2. SUBMITTALS

- a. Submit product data indicating general assembly, components, controls, safety controls, wiring diagrams and service connections, and manufacturer's installation instructions.
- b. Submit field reports indicating condition and operation of start-up.
- c. Submit reports indicating specified performance and efficiency has been met or exceeded.

3. OPERATION AND MAINTENANCE DATA

a. Submit operation and maintenance data, including manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

4. QUALITY ASSURANCE

a. Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum three (3) years experience.

5. REGULATORY REQUIREMENTS

- a. Conform to ANSI/ASME and SEC 8D for construction of boilers and be UL certified. Boilers to be AHRI certified.
- b. Conform to applicable code for internal wiring of factory-wired equipment.

6. WARRANTY

a. Shall be manufacturer's 10-year limited warranty.

B. MATERIALS

a. Provide factory-assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, combustion air and vent services.

1. MANUFACTURER

- a. <u>Shall be</u>:
 - 1) Lochinvar.
 - 2) Or Architect approved equal.

- b. <u>Modulating Burner</u>: Shall have 5:1 turndown, direct spark ignition, Low NOx operation and sealed combustion.
- c. <u>Condensing Heat Exchanger</u>: Shall be ASME certified, "H" stamped gasketless with 160 psi working pressure.
- d. <u>Direct Vent:</u>

C. INSTALLATION AND STARTUP

- 1. GENERAL
 - a. Install in accordance with manufacturer's instructions.
 - b. Contractor to provide chemical for boil out and cleaning.
 - c. Pipe relief valves to nearest floor drain.
 - d. Prepare and start boiler systems prior to acceptance.
 - e. Provide field representative for starting unit and training operator.
 - f. Provide combustion test and submit report.
 - 1) Test shall include:
 - a) Boiler Firing Rate.
 - b) Overfire Draft.
 - c) Gas Flow Rate.
 - d) Heat Input.
 - e) Burner Manifold Gas Pressure.
 - f) Percent Carbon Monoxide (CO).
 - g) Percent Oxygen (OX).
 - h) Percent Excess Air.
 - i) Flue Gas Temperature at Outlet.
 - j) Ambient Temperature.
 - k) Percent Stack Loss.
 - I) Percent Combustion Efficiency.
 - m) Heat Output.

23 31 00 - DUCTWORK

A. GENERAL

1. SCOPE

a. This section covers furnishing all labor, materials, tools and equipment required to install all sheet metal work, flexible ductwork, grilles, registers, diffusers, etc., as shown on the Drawings, as herein specified and/or as required for a complete job.

2. SHOP DRAWINGS

a. Provide shop drawings to the Architect for review showing grilles, registers, diffusers, etc.

B. MATERIALS

- 1. For convenience and as a method of establishing the type and quality of products desired, trade names of various manufacturers have been used.
 - a. Products meeting these specifications as manufactured by others may be submitted to the Architect for approval.
- 2. ABOVE GROUND DUCTWORK
 - a. All rigid ductwork shall be galvanized steel, fabricated and installed according to the latest edition of the SMACNA HVAC Duct Construction Standards, with ducts cross-broken (all flat surfaces greater than 12" in any direction), braced and stiffened with turning vanes in all square elbows. Minimum gauge shall be as follows:
 - 1) Exposed ductwork shall be 24-gauge minimum except where flexible ductwork is shown on Drawings.
 - 2) Exterior ductwork gauge shall be determined in accordance with SMACNA Duct Construction Standards, but no less than 24-gauge. Where rectangular ducts are installed against two gypsum board surfaces, duct board with reinforced Foil Face Scrim may be used.
 - b. Install splitter and volume dampers (that will be accessible) as required to balance the system where shown and/or in all duct branches; rigid, stiffened, brazed to shaft, with sturdy lock and handle extended to accessible area and chrome finished in occupied space.
 - c. All supply air ducts, all outside air ducts, exhaust ducts in the attic and all mixed air ducts shall be insulated with blanket fiberglass, 1-1/2" thickness, with FSK vapor barrier.
 - 1) Fiberglass insulation shall have a minimum density of 1.5 pcf.
 - 2) Insulation shall be one of the :
 - a) Owens-Corning
 - b) Manville.
 - 3) Seal all joints, seams and edges with matching FSK tape.
 - d. Flexible duct shall be Thermaflex or Architect approved equal.

- 1) Provide Flex Flow elbow duct supports at all 90° bends.
- 2) Ducts shall be M-KC series with R4.2 in heated space and R6 in the attic.
- e. Where sound treated ducts are noted, provide double-wall ductwork with a perforated inner liner for a minimum of 10' after the first elbow from the main trunk.
 - 1) Liner shall be 2" thick, tested against erosion to at least 110% of scheduled duct velocity, and treated with an anti-microbial surface coating.
- f. For exterior duct applications, provide 3" thickness insulation board (min. R-8), with additional tapered insulation to drain water, and with manufacturer's approved weatherproof, UV-protected jacketing or mastic; insulation to be continuous through wall and roof penetrations, and hangers.
 - 1) Provide flashing as required by the application for exterior wall and roof penetrations.
 - 2) Submit shop drawings of exterior duct insulation weatherproofing system, including installation procedures and requirements.

2. GRILLES, REGISTERS, DIFFUSERS AND LOUVERS

- a. <u>Manufacturer</u>:
 - 1) Titus, Hart & Cooley.
 - 2) Or Architect approved equal.
- b. All common air outlets must be supplied with an integral balancing device.
- c. All HVAC trim shall be manufactured in sizes as indicated on Drawings.
- d. Diffusers shall be multi-directional unless indicated otherwise on Drawings.
- e. All air outlets must be supplied with an integral balancing device.
- f. All penetrations to the building exterior shall be equipped with bird/insect screens.
- g. Exhaust grilles in apartment units shall be manufactured by AmeriFlow, Model No. 470, 6 x 6.
- h. All gypsum board penetrations intended to permit the passage of air shall be equipped with HVAC trim.
 - 1) This requirement is intended to include, but not be limited to, requiring finish trim at both sides of openings for transfer grilles.
- i. Supply air grilles in apartment units shall be manufactured by AmeriFlow, Model No. 291L.

3. EXHAUST FANS

- a. All exhaust fans shall be located and sized as noted on the Drawings.
 - 1) All parts exposed to weather shall be constructed of durable aluminum or fiberglass.
 - 2) All exhaust fans shall bear AMCA certified rating seal.

4. FIRE AND/OR ZONE DAMPERS

- a. Fire dampers to be certified under UL 555.
 - 1) Smoke/fire dampers shall comply with UL 555 and UL 555S.
 - 2) Install fire/smoke rated dampers in return air ducts where shown on Drawings.

5. CONSTANT VOLUME DAMPERS

- a. <u>Shall be manufactured by</u>:
 - 1) TROX, Model No. VFL.
 - 2) Or Architect approved equal.

C. INSTALLATION

- 1. GENERAL
 - a. Installation of all equipment, fittings and trim described under this section shall be in accordance with all applicable rules and regulations including SMACNA Standards and all federal, state and local codes, ordinances and regulations.

2. SEALING CONNECTIONS

- a. All joints and connections in the duct work shall be sealed with either mastic, welds, gaskets or mastic embedded fabric or tapes installed in accordance with manufacturer's instructions.
 - 1) Duct tape shall <u>not</u> be used.
 - 2) Tapes and mastic shall be listed and labeled in accordance with UL 181A or UL 181B.
- b. At duct connections to mechanical equipment, duct shall be mechanically fastened in addition to the sealing requirements listed above.
- c. Tapes and mastic shall be listed and labeled in accordance with UL 181A or UL 181B.
- 3. REGISTERS, GRILLES AND ROUGH-INS
 - a. HVAC supply registers, return grilles and rough-ins shall be covered during construction to prevent dust and other pollutants from entering the system.

4. CONSTANT VOLUME AIR DAMPERS

- a. Install constant volume air dampers into exhaust ducts directly behind the wall grille.
 - 1) Label duct at damper location.

26 00 00 - ELECTRICAL GENERAL REQUIREMENTS

A. GENERAL

- 1. SCOPE
 - a. Provide all required labor, materials, equipment and Contractor services necessary for the complete installation of equipment indicated herein and on the drawings complete with all related services.
 - b. Review all local utility requirements as they relate to Electrical work and include costs in bid.
 - c. Coordinate requirements with other Trades as required.
- 2. CONTRACT DOCUMENTS
 - a. The drawings are diagrammatic only, but are to be followed as closely as actual construction of the project and work of other trades will permit.
 - 1) Minor changes from these drawings, necessary to coordinate with the work of other trades and to make the work of this Contractor conform to the project as constructed, are to be made at no additional cost to the Owner.
 - b. Drawings are <u>not</u> to be scaled for the purpose of equipment installation.
 - c. All measurements to be derived from field conditions.
 - d. All measurements must be verified.
 - e. The Contractor is responsible for all work fitting into place in a satisfactory and workmanlike manner.
- 3. CODES, STANDARDS AND PERMITS
 - a. All work shall be in accordance with National, State and Local codes in force at time of bidding, including but not limited to the National Electrical Code.
 - 1) In addition, the Contractor shall be responsible for obtaining all necessary permits and inspection approvals as the work progresses.
 - a) Any work which is completed without these approvals and found to be unacceptable shall be corrected by the Contractor, at no additional cost.
 - b. The Contractor shall be responsible for payment of all fees associated with inspections, permits and utility connections unless otherwise indicated.
- 4. SHOP DRAWINGS AND SUBMITTALS
 - a. Provide all submittals as called for in the Specifications including shop drawings, samples, material lists, Schedule of Value, etc. SHOP DRAWINGS SHALL BE COMPLETELY REVIEWED AND APPROVED BY THE CONTRACTOR AND TRADE FURNISHING THE EQUIPMENT (INDICATED BY THE CONTRACTOR'S APPROVAL STAMP) PRIOR TO SUBMITTING TO THE ARCHITECT.
 - b. Where shop drawing submittals are assembled in a folder or bound sets, all

folders or sets are to be identical and each set must contain an index of the items enclosed in the set or folder.

- 1) Quantity of original color samples required shall be coordinated with the Owner.
- c. Review and approval of shop drawings by the Architect is for general conformity to design intent only.
 - 1) This review does not authorize changes to the contract sum or relieve the Contractor in any way of his contract obligations.
- d. Provide submittals for the following:
 - 1) Raceways
 - 2) Wire and Cables
 - 3) Wiring Devices
 - 4) Panelboards and Breakers
 - 5) Light Fixtures
 - 6) Fire Alarm System
 - 7) Wireless Emergency Call System
 - 8) Entry/Intercom System
 - 9) Smoke Detection
 - 10) Door Chimes
- 5. PAINTING AND FINISHING
 - a. Unless otherwise indicated in other Divisions of the Specifications, at no additional cost to the Owner, repaint all patched areas to match original finish where holes or chases have been cut to receive electrical work.
 - 1) Repaint patched areas with two (2) coats of paint to match surrounding areas; blend as required.
 - b. Touch up marred surfaces of equipment housing with enamel of a color to match.
- 6. DEMOLITION
 - a. Before starting demolition work, review all requirements for final remodeling work so that usable existing system components as required for completion of the new work are not destroyed.
 - 1) Coordinate all work with the other Contractors.
 - b. All electrical equipment and circuits that are damaged or destroyed during demolition and are not called out to be removed on the drawings must be restored to original condition.
- 7. CUTTING AND PATCHING
 - a. Lay out work carefully in advance, and where cutting, channeling, or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, the work is to be carefully done and any damage to the building, piping, or equipment repaired by skilled mechanics of the trade involved, at no additional cost to the Owner.
- 8. RECORD DRAWINGS

- a. Provide Electrical record drawings as called for in Division <u>1 GENERAL</u> <u>REQUIREMENTS</u> and include the following:
 - 1) All pertinent information not shown.
 - 2) All changes from the original plans.
 - 3) Route of all underground and overhead feed conduits from the main switchboard to the various panels and equipment.
 - 4) Interconnecting conduits between branch circuit, junction boxes, and panels (actual route of conduit is not required, only how the various branch items are interconnected with conduit and number of wires).
 - 5) Circuit numbers for all items where they do not agree with the plans.
 - a) Circuit numbers on record drawings and panelboard directories must agree.

9. CHANGES, CONTRACT DOCUMENTS

a. The Contract Documents may be superseded by later revised drawings or specification addenda prepared by the Architect, and all reasonable changes (up to 3') in location of equipment prior to its installation, shall be made without additional cost to the owner.

10. OPERATING AND MAINTENANCE MANUALS AND INSTRUCTION

- a. Provide three (3) bound sets of complete Installation, Operating, and Maintenance Instructions as outlined in Division <u>1 GENERAL REQUIREMENTS</u>.
- b. Manuals shall also include:
 - 1) Complete Parts Lists.
 - 2) Operating Instructions.
 - 3) Copies of Original Shop Drawings.
 - 4) Subcontractor Lists.
 - 5) Warranties, Warnings, etc.
 - 6) Generic instructions shall highlight applicable sections when needed to differentiate from non-relevant equipment.
 - 7) All tools supplied with equipment.

11. GUARANTEES AND WARRANTIES

- a. All labor, materials and equipment shall be guaranteed by the Contractor and warranted by the manufacturer for a period of 1 year from the date of Substantial Completion, unless longer period is specified for specific equipment.
 - 1) Lamp guarantee is limited to replacing all defective or non-operating lamps installed under this contract at time of substantial completion.
- b. The Contractor shall make all necessary repairs and alterations during the guarantee period as may be required by the Owner or Architect for correct system operation and to comply with the drawings and specifications.
 - 1) These repairs and alterations shall be at no additional cost to the Owner.
- c. The Owner reserves the right to make emergency system repairs without voiding the Contractor's guarantee.

26 05 33 - RACEWAYS AND FITTINGS

A. GENERAL

- 1. SCOPE
 - a. Provide a complete system of raceways for all conductors sized as indicated and required.
 - 1) Where sizes are not indicated, provide sizes in accordance with National Electric Code (NEC) requirements.

2. CONDUIT

- a. Use minimum conduit size of 3/4" except to wire runs of 12' or less in length, or as noted on the drawings, in which case 1/2" conduit may be used.
- b. All flexible metallic conduit (excluding fixture whips) to be 3/4" minimum.
- 3. CONNECTION TO UTILITY TRANSFORMER
 - a. Contractor to seek out the requirements for new feed to building with the electric utility.
 - 1) All materials and details for a new building feed shall conform to those requirements.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. <u>Conduit: Rigid Steel, IMC and EMT</u>:
 - 1) Allied Tube and Conduit
 - 2) Westem-Tube
 - 3) Republic Conduit
 - b. <u>Exposed Surface Metal Raceway</u>:
 - 1) Wiremold
 - 2) Panduit
 - c. <u>Fittings</u>:
 - 1) Appleton
 - 2) Thomas and Betts
 - 3) Raco
 - 4) O. Z. Gedney
 - 5) Crouse-Hinds
- 2. MATERIALS
 - a. Provide the following types of raceways for the specified application or location indicated:
 - 1) <u>Rigid Galvanized Steel</u>: Where specifically indicated on the drawings or required by code or utility company.
 - 2) <u>Electrical Metallic Tubing (EMT)</u>: Only within buildings and where not exposed to mechanical injury.

- 3) <u>Exposed Surface Raceway</u>: Only where indicated on plans or as directed by the Architect.
- 4) <u>MC Cable</u>: Only as indicated on Plans.
- b. <u>Sleeves to be as follows:</u>
 - 1) Schedule 40 black steel.
 - 2) Schedule 80 PVC.
- c. Seals to be materials or devices approved for the application.

C. EXECUTION

- 1. INSTALLATION
 - a. Install raceways as indicated.
 - 1) Conceal raceways wherever possible within finished walls or ceilings.
 - 2) Space raceways a minimum of 6" from parallel runs of flues, steam pipes and water pipes, etc.
 - b. Take care to prevent the entrance of foreign matter into raceways, boxes, fittings and equipment.
 - 1) Clogged raceways must be entirely free of obstructions or be replaced.
 - 2) Place caps on the ends of conduit runs as soon as they are located to prevent intrusion of foreign materials.
 - c. Run all raceways in existing finished areas concealed above ceilings, in walls, in pipe chases, etc.
 - 1) Where concealment is impossible, surface raceway may be installed as approved by the Architect.
 - 2) Approval is required except where surface raceway is shown on plans.
 - d. Install exposed raceways parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings.
 - 1) Make changes in direction of runs with symmetrical bends or cast metal fittings.
 - 2) Make field bends or offsets with an approved bending tool.
 - 3) Do not install crushed or deformed raceways.
 - e. Provide nylon pull strings in all empty conduits except sleeves and nipples.
 - f. Ground and bond conduits in accordance with the NEC.
 - g. Provide an equipment ground conductor within all raceways. Size grounding conductors as required by the NEC.
 - h. Use approved type couplings and connectors in all conduit runs and make all joints tight. EMT fittings shall be steel. Cast metal fittings are not acceptable.
 - i. Provide pipe sleeves required for electrical work, sized for 1/4" clearance between sleeve and material passing through unless sleeve size is noted on plans.
 - j. Seal electrical openings and sleeves with approved waterproof and fireproof caulking.

- k. Support raceways securely and fasten in place at intervals as required by the NEC.
 - 1) Use pipe straps, wall brackets, hangers, or ceiling trapeze.
 - 2) Use fastenings of an approved type for the construction type material encountered.
 - 3) Lead anchoring shields, perforated strap hangers or wire will not be permitted.
- I. Fasten raceways securely to all sheet metal boxes and cabinets with double locknuts.
 - 1) Install insulated bushings on the ends of all conduits.
- m. Ceiling support wires shall not be used as means of support for raceways.

26 05 13 - WIRES AND CABLES

- A. GENERAL
 - 1. SCOPE
 - a. Provide a complete system of wires for all raceway systems and cables.
 - 1) Wire to be of sizes and types indicated and as required by the NEC for specific use.

2. WIRE QUANTITIES

a. Where wire quantities in a raceway or cable system are not specifically indicated, provide the number of wires required to maintain function, control and number of circuits.

3. QUALITY ASSURANCE

Wire and cable shall have been manufactured not more than 2 years prior to installation.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURES
 - a. American Insulated Wire Corporation.
 - b. Belden Wire and Cable.
 - c. Triangle PWC, Inc.
 - d. Pirelli Cable Corporation.
 - e. Southwire Company.
- 2. MATERIALS
 - a. Wire to be 98% conductivity soft or annealed copper, to ASTM specifications.
 - b. Wire insulation must conform to all IPCEA and NEMA Standards for voltage and environmental conditions encountered.
- 3. WIRE SIZES
 - a. Sizes to be not less than indicated.
 - b. Branch circuit wire to be No. 12 AWG minimum.
 - c. Wire for branch circuits of 120 volts, more than 100' long, from panel to load center, to be No. 10 AWG minimum.
- 4. INSULATION
 - a. Insulation types shall be as follows unless noted otherwise:
 - 1) <u>No.8 AWG, or Larger Wire</u>: Type RHW, THWN or XHHW. XHHW for interior use only.

- 2) <u>Smaller Than No.8 AWG</u>: Type THWN, THHN, XHHW, except that 16 AWG wire for Class 2 remote-control circuits and signal circuits may be commercial fixture wire Type RF-2 or TF. XHHW for interior use only.
- b. <u>All Wire Sizes for Ambient Temperatures in Excess of 75° C</u>: Types RHH, THHN or SA.
- 5. IDENTIFICATION
 - a. <u>Color code wire for 120/208 volt, three phase, four wire systems as follows:</u>
 - 1) <u>A-Phase</u>: Black
 - 2) <u>B-Phase</u>: Red
 - 3) <u>C-Phase</u>: Blue
 - 4) Neutral: White
 - 5) Ground: Green
 - a) Contractor to confirm that the existing wiring conforms to these conventions.
 - b) If existing wiring is different, notify Architect in writing and adjust color coding of new wiring to match existing.
 - b. Identify wire circuits by plastic coated, self sticking, printed markers.

C. EXECUTION

- 1. INSTALLATION
 - a. Conductors to be continuous from outlet to outlet, junction box, terminal box, etc.
 - b. Hold splices to a minimum, make in readily accessible junction, pull or outlet boxes and insulate to equal the conductor insulation.
 - 1) Make splices and connections in a manner approved by all applicable codes.
 - c. Color code all service, feeder and branch circuit wire as called for in this specification and in accordance with Article 210 of the NEC.
 - d. Provide all wire with identification within each enclosure where a tap, splice or termination is made.
 - e. Do not subject cable or wire to excessive, damaging stress.
 - f. Do not install cable or wire until raceways and surrounding areas are free of dust, moisture or other contamination.
 - g. Install all conductors in raceways unless otherwise shown on the plans or called for in other sections of this specification.

26 05 16 - FEEDER AND BRANCH CIRCUITS

A. GENERAL

- 1. SCOPE
 - a. Provide a complete system of feeder and branch circuit wiring and raceways as indicated by the Contract Documents.

B. PRODUCTS

- 1. MATERIALS
 - a. As required by other sections.

C. EXECUTION

- 1. INSTALLATION
 - a. System to be complete from service to distribution equipment and from distribution equipment to outlets, motors, appliances, transformers, controls etc.
 - b. Verify current and overload protection of equipment requiring electrical connection.
 - c. Install feeders and branch circuits of proper size for actual equipment provided.
 - 1) If feeder sizes will deviate from that shown on Drawings notify the Architect/ Engineer for direction before proceeding.
 - 2) Increased costs for larger feeders will only be allowed after specific approval from Architect/Engineer before proceeding.
 - d. Provide a separate neutral conductor with each phase conductor.
 - 1) Multiple phase conductors, three (3) maximum, may be served by a single neutral conductor only where specifically indicated on the Drawings.
 - e. Hold splices to a minimum, make in readily accessible junction, pull or outlet boxes and insulate to equal the conductor insulation.
 - 1) Make splices and connections in a manner approved by all applicable codes.
 - 2) No branch circuit shall be spliced more than twice.

26 05 26 - GROUNDING

- A. GENERAL
 - 1. SCOPE
 - a. Provide grounding for all non-current carrying metallic parts of the electrical and communications systems and neutral conductor of the wiring system.
 - b. Install complete grounding system in accordance with the National Electrical Code, and the National Electrical Safety Code.

B. PRODUCTS

- 1. MATERIALS
 - a. Grounding conductors to be copper wire, of the size required by the National Electric Code or as shown on the Contract Drawings.
 - 1) Make all connections and splices in the grounding system by means of solderless connectors.
 - b. Ground rods to be of copper-clad steel not less than 1" in diameter, and 15' long.
 - c. Refer to drawings for grounding details.

2. ACCEPTABLE MANUFACTURES

- a. Anderson.
- b. Burndy.
- c. Erico.
- d. Harger.
- e. Approved Equal.

C. EXECUTION

- 1. INSTALLATION
 - a. Install separate copper grounding conductor, insulated green, in all metallic and non-metallic raceways.
 - 1) Note that grounding conductors are not indicated on Drawings (where wire counts are shown) but shall be provided in all raceways.
 - b. Install separate copper grounding jumper, insulated green, from the grounding screw of all receptacle devices to the metallic box in which mounted if devices are not of the self-grounding type except where indicated as isolated ground type.
 - c. Main Service and main building disconnecting requires grounding:
 - 1) Make grounding and bonding connections at the building main service

equipment or main disconnecting means and extend the grounding electrode conductor to the point of entrance of the metallic water service main.

- 2) Make connections to the water pipe by a suitable grounding clamp.
 - a) If flanged pipes are encountered, make connections with the lug bolted to the street side of the flange connection.
- 3) Enclose the grounding conductor in rigid metal conduit and solidly bond the grounding conductor to the conduit at entry and exit wherever used.
- 4) The raceway for main grounding electrode conductor shall be exposed and accessible within the Electrical Equipment Room to allow for interconnection with ground conductors of all communications systems.
 - a) In addition to the grounding system indicated above, make ground connections to driven ground rods on the exterior of the building with a maximum resistance to ground of 5 OHMS under normally dry conditions.
 - b) Three driven ground rods set in a triangular arrangement shall be utilized, spaced not less than 10' on centers.
 - (i) Make a ground connection to 20' of building footing reinforcing bars.
 - c) Driven ground rods shall be located in unpaved areas only.
 - d) Rods shall be fully driven with at least 2" of cover over top of rod.
- 5) Ground main power distribution transformer secondary neutrals, as required for service system grounding.
- 6) Ground the secondary neutral of local transformers used in the power distribution system to the service ground through an independent insulated grounding conductor.
- 7) Install ground bus and rods in transformer and equipment rooms for primary service.
 - a) Install rods as hereinbefore specified.
 - b) Install ground bus in integrated equipment housing or separately.
 - (i) Connect the ground bus to both the system neutral and as indicated above.
 - (ii) Effectively ground all non-current carrying parts of the electrical equipment by connecting to the ground bus.

2. COMMUNICATION GROUNDING

- a. <u>Telephone</u>:
 - 1) Provide one (1) #6 AWG in 3/4" conduit from main building ground conductor raceway to ground bus in telephone equipment room and extend continuous to telephone service conduit and to conduits terminating at backboard.
 - 2) Fire Alarm, Television Distribution, Computer/Data Distribution System.
- b. For each system provide one (1) #8 AWG in 1/2" conduit from main building ground conductor raceway to nearest ground bus.

26 05 30 - WIRING FOR MECHANICAL EQUIPMENT

A. GENERAL

- 1. SCOPE
 - a. Comply with requirements of mechanical specification for mechanical work.
 - b. Include line voltage wiring, control wiring and required disconnect switches for all installed mechanical equipment.
 - c. Provide control transformer for any equipment not so equipped for 120/1/60 operation.
 - 1) Electrical wiring must be complete in every respect and tested ready for Owner's operation.
 - d. The electrical contractor shall seek out the wiring requirements from the installing contractor and obtain copies of the respective shop drawings and wiring drawings furnished with or for the equipment.

26 05 34 - BOXES

A. GENERAL

- 1. SCOPE
 - a. Provide boxes in raceway systems wherever required for pulling of wires, making connections and for mounting of devices or fixtures.
 - 1) Each box shall have at least the minimum volume and dimensions required by the National Electric Code for the number and size of conductors and raceways connected.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. Appleton.
 - b. Raco.
 - c. Steel City.
- 2. MATERIALS
 - a. Boxes shall be not less than 1-1/2" deep, except where approved.
 - b. Boxes shall be not less than 4" x 4" except where only a single raceway of 3/4" or smaller enters the box or where specifically required for the particular piece of equipment being mounted in or on the box.
 - c. Provide extension or plaster rings for boxes as required.
 - d. Boxes for use in masonry or tile walls shall be square cornered masonry/tile type or standard boxes with square corner tile type covers.
 - 1) Depth shall allow for conduit installation without cutting block shells.
 - e. Boxes shall be cast or galvanized steel construction except as approved.
 - f. Use cast metal type boxes when located in normally wet locations or when exposed to physical damage.
 - 1) Boxes in wet locations shall be gasketed.
 - g. Furnish screwed or hinged and latched covers for all boxes.

C. EXECUTION

- 1. INSTALLATION
 - a. Support boxes, pendants, cables, etc., for surface-mounted fixtures on suspended ceilings independently of the ceiling supports.
 - b. Secure boxes and supports to building structural system in accordance NEMA and UL requirements.

26 05 83 - WIRING DEVICES AND PLATES

A. GENERAL

- 1. SCOPE
 - a. Provide wiring devices and plates as indicated by the Contract Documents. Unless otherwise indicated, devices shall be standard NEMA for the particular application.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. Hubbel.
 - b. Arrow-Hart.
 - c. Pass & Seymour.
 - d. General Electric.
 - e. Leviton.
- 2. MATERIALS
 - a. All devices and plates shall be specification grade, 20-amp minimum unless otherwise indicated or required.
 - b. Switches shall be quiet type, totally enclosed, back and side wired, 120-277 volt rated. Service type shall be as indicated (i.e., single pole, three-way, etc.) and in accordance with the following (Hubbell model numbers are used for reference purposes):
 - 1) Single pole: #1221 series.
 - 2) Double Pole: #1222 series.
 - c. Receptacles shall be grounding type with grounding strap unless otherwise indicated, totally enclosed, back and side wired. Service type shall be as indicated (i.e., single outlet, duplex, etc.) and in accordance with the following (Hubbell model numbers are used for reference purposes):
 - 1) 2-Pole, 125-Volt, Single: 5361 series.
 - 2) 2-Pole, 125-Volt, Duplex: 5362 series.
 - 3) 2-Pole, 125-Volt, Duplex, Isol. Ground: IG 5362 series.
 - 4) 2-Pole, 125-Volt, Duplex, Ground Fault: GF 5361 series.
 - 5) 2-Pole, 125-Volt, Duplex with Surge Suppression and Isolated Ground: IG 5352-S.
 - 6) Provide NEMA standard configuration for special outlets rated above 20amp and/or above 125-volt unless otherwise required for a particular piece of equipment.
 - 7) Coordinate exact types with actual equipment provided.
 - d. Device plates shall be one-piece plastic for all single and multi-ganged.
 - 1) Color to match device color.

- e. Device color shall be as chosen by Architect.
- f. Receptacles in wet locations shall be installed with an outlet enclosure clearly marked "Suitable For Wet Locations While in Use".
 - 1) There must be a gasket between the enclosure and the mounting surface, and between the cover and base.
 - 2) The enclosure must employ stainless steel mounting hardware and be constructed of impact-resistant polycarbonate.
 - 3) The outlet enclosure shall be listed by Underwriters Laboratories, Inc.
 - 4) Enclosure manufactured by:
 - a) TayMac Corporation.
 - b) Carlon/Lamson.

C. EXECUTION

- 1. INSTALLATION
 - a. Devices installed in damp or wet locations shall be installed with box and cover plate combination rated for wet locations.
 - 1) Install as recommended by manufacturer.
 - b. Mount devices as follows unless otherwise indicated (heights indicated are to centerline of device above finish floor except as noted):
 - 1) Switches, Thermostats: 46".
 - 2) Receptacles, Telephone/Data/Television Outlets: 18".

26 28 10 - DISCONNECT SWITCHES

- A. GENERAL
 - 1. SCOPE
 - a. Provide disconnecting means for all electrically-operated equipment in accordance with National Electrical Code (NEC) and Contract Document requirements.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a Square D.
 - b General Electric.
 - c Cutler Hammer.
- 2. MATERIALS
 - a Switches shall be heavy duty, UL listed, horsepower rated type with number of poles, fused or unfused, and electrical characteristics as indicated.
 - 1) Operating handle shall be able to be locked in the off position.
 - 2) Switch shall disconnect all ungrounded conductors.
 - b Enclosure shall be of the proper NEMA type to suit the particular application as follows:
 - 3) <u>General Indoor Service</u>: NEMA 1.
 - 4) <u>Outdoor or Wet Area Service</u>: NEMA 3R.
 - 5) <u>Corrosive Environment</u>: NEMA 4.
 - 6) Industrial Production and High Dust: NEMA 12.
 - 7) Explosive Vapor Areas: As noted.
 - c Provide neutral terminal in all disconnect switches serving equipment that utilizes a neutral conductor.
 - d Switch shall be service entrance labeled where required.
- 3. SMALL LOAD DISCONNECTS
 - a For fractional horsepower single phase loads and resistive loads up to 16 amperes (when overload and thermal protection are not required), specification grade one or two pole toggle switches may be utilized.
 - 1) Switch rating must be at least 125% of the full load current of the equipment.
 - b For 120-volt, fractional horsepower loads requiring overload protection, provide a Bussmann Box-Covered Fused Disconnect with a lighted handle.
 - 1) Part #SSY- L. Provide S-type fuses as required to meet the equipment manufacturer's overload requirements.

- c Where thermal protection is required, provide manual motor starters with melting alloy thermal overloads.
 - 1) Square D Class 2510
 - 2) Or equal.

C. EXECUTION

- 1. INSTALLATION
 - a. Provide fuses of appropriate type for all fused disconnects.
 - b. Install disconnects in accordance with NEC and manufacturer's requirements.

26 24 02 - MAIN SWITCHGEAR

A. GENERAL

- 1. SCOPE
 - a. Low voltage dead front, completely metal enclosed self-supporting switchgear assembly with current and voltage ratings as indicated on the Drawings.
 - 1) Complete from the incoming line connections to the outgoing feeder connections in one assembly, including all necessary appurtenances for proper operation.
 - b. Equipment shall comply with the latest applicable ANSI, NEMA, and UL standards.
 - c. Service entrance equipment must comply with all NEC and UL requirements and contain UL service entrance label.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS (OR APPROVED EQUAL)
 - a. Square D.
 - b. Westinghouse.
 - c. General Electric.
 - d. Siemens/ITE.
- 2. MATERIALS
 - a. <u>Enclosure</u>:
 - 1) Sectionalized, dead front with front accessibility.
 - 2) Fabricate framework of formed code gauge steel rigidly welded and bolted together to support all cover plates, bussing and component devices during shipment and installation.
 - 3) Provide removable cover plates.
 - 4) Hinge all front covers over circuit breakers, fuse racks and metering devices with removable hinge pins.
 - 5) Provide each section with three basic compartments: front breaker compartment, center bus compartment and rear feeder compartment.
 - 6) Provide each section with adequate lifting means and capability of being rolled or moved into installation position.
 - 7) Construct ventilation and other openings to prevent entrance of foreign objects.
 - b. Circuit Breaker Compartment:
 - 1) Front compartment is to contain the circuit breaker elements, fixed or drawout as shown on the drawings, each individually mounted in its own barriered cell with steel barriers on top, bottom and sides and a molded glass polyester barrier in the rear.
 - 2) Completely cover circuit breaker with a solid steel cell door equipped with a flush latch and external trip and close operator.

- 3) Double barrier each circuit breaker to safely permit operating and racking with the hinged door open.
- 4) Provide automatic shutters over live bus stabs in rear of drawout breaker cells.
- 5) Provide active or future use cells equipped for circuit breakers complete with drawout mechanism and all current carrying parts.
- 6) No live parts are to extend into the drawout breaker compartment with the breaker removed.
- c. Bus Compartment:
 - 1) Center compartment is to contain the section riser bus and main through bus of continuous current rating as called for on the drawings.
 - 2) Rigidly brace bus bars to withstand short circuit fault current rating called for on the Drawings.
 - 3) Provide full capacity neutral where a neutral is indicated on the drawings with a stud extending into the feeder compartment of each section.
 - 4) Provide splice bars with rating equivalent to that of the main bus for Switchboards of more than one shipping section and joint bolts.
- d. <u>Rear Feeder Compartment</u>:
 - 1) Size feeder compartment to accommodate all incoming and outgoing feeder bus or cable required within each switchboard section and ties to runback bus from individual breaker compartments.
 - 2) Provide a plated copper equipment ground bus bolted directly to the Switchgear frame extending the entire length of the switchboard with an incoming ground lug and ground lugs for each outgoing feeder.
 - 3) Barrier the main lug compartment from the line side bussing and circuit Breaker compartment for service entrance applications.
- e. <u>Power Circuit Breaker Mountings</u>:
 - 1) Provide fixed mounting for 4000 ampere frame circuit breakers.
 - 2) Provide drawout type mounting for 3000 to 800 ampere frame circuit breakers with the following features:
 - a) Rigid, self-aligning mechanism having "Connected," "Test/Disconnected" and "Remove" positions.
 - Secondary control connections made through a multipoint, semiautomatic connector which, by its engaged or disengaged status determines the distinct "Test" and "Disconnected" positions.
 - c) Compartment door capable of being closed in all positions.
 - d) Interlocks to insure that a breaker is open before it can be moved from any position or when it is between positions.
 - e) Padlocking provisions to receive up to three padlocks when the breaker is in the "Connected" or "Test/Disconnected" positions only, to prevent unauthorized breaker operation
- f. <u>Power Circuit Breakers</u>:
 - 1) Provide electrically operated power circuit breakers with adjustable solid state trip of current ratings and interrupting capacities shown on Drawings, rated for 100% continuous duty with interchangeable ampere rating plugs.
 - Breaker operating mechanism is to be two-step stored energy, quickmake,quick-break type with common tripping of all poles and a maximum five (5) cycle closing time.

- Provide on the face of the breaker buttons to open and close the breaker and indicators to show position of the contacts, status of the closing springs, overload and short circuit.
- 4) Solid state electronic trip to be adjustable for complete system selective coordination, consisting of the following adjustable trip settings:
 - a) Long-time ampere rating
 - b) Long-time delay
 - c) Short-time pickup
 - d) Short-time delay
 - e) Instantaneous pickup
- 5) Circuit breakers to be UL listed for reverse connection without requiring special construction and with a 30 cycle short-time withstand rating.
- 6) Provide circuit breakers with integral equipment ground fault protection, where indicated on the drawings, containing the following features:
 - a) Adjustable Ground Fault Pickup and delay.
 - b) Residual type ground fault sensing.
 - c) Ground fault test button and indicator.
 - d) Neutral current transformer.
- 7) Provide circuit breakers with zone selective interlocking on the short time trip and ground fault feature to insure maximum protection, yet permit optimum coordination between main and feeder breakers.
- 8) Provide breakers with accessories noted on the Drawings.
- 9) Provide main circuit breakers with shunt trips for remote tripping when indicated.
- g. <u>Current Limiting Fuses</u>:
 - Provide main power circuit breaker, where indicated on the Drawings, with current limiting fuses, separately mounted for 3000 and 4000 ampere frames, or integrally mounted on 1600 ampere frames, coordinated with the breaker trip devices to avoid unnecessary blowing of the current limiters and include an anti-single phase device to trip the breaker in the event of a blown limiter; indicate which limiter is blown and prevent the breaker from being reclosed on a single phase condition due to missing or blown limiters.
 - Make current limiters integrally mounted with a breaker inaccessible until the breaker is completely withdrawn from its compartment to assure complete isolation.
 - 3) Make current limiters separately mounted in a fuse-truck inaccessible until the fuse-truck is completely withdrawn with fuse isolated and provide a key interlock to prevent fuse-truck withdrawal or insertion unless the breaker is open.
 - 4) Power circuit breakers with current limiting fuses to have 200,000 ampere rms symmetrical interrupting capacity at 600 volts and below.

C. EXECUTION

- 1. INSTALLATION
 - a. Install low voltage switchgear where shown on the Drawings in a manner to insure proper clearance from adjacent walls equipment, etc., to meet code requirements.
 - b. Protect equipment during construction to prevent damage and entry of foreign materials.

- c. Install switchgear in accordance with manufacturer's instructions.
- d. Bond main switchgear enclosure and neutral bus to grounding system.

26 24 10 - BRANCH CIRCUIT LOAD CENTERS

- A. GENERAL
 - 1. SCOPE
 - a. This section includes load centers to be furnished and installed at locations as shown on the drawings.
 - 1) Load centers shall be of the type approved, indicated and specified herein.
 - 2. REFERENCES
 - a. <u>NEMA AB 1</u>: Molded case circuit breakers and molded case switches.
 - b. <u>NEMA PB 1</u>: Panelboards.
 - c. <u>NEMA PB 1.1</u>: General instruction for safe installation, operation and maintenance of panelboards rated 600 volts or less.
 - d. <u>Federal Specifications W-C-375B</u>: Molded case circuit breakers.

B. PRODUCTS

- 1. MANUFACTURES
 - a. Load centers shall be manufactured by:
 - 1) Square D Company.
 - 2) Or approved equal.

2. ENCLOSURES

- a. <u>Interior Panels</u>: Type I, unless noted on the drawings.
- b. A directory label shall be provided with circuits identified as indicated on the schedule.
- 3. INTERIORS
 - a. Bus bar connections to the branch circuit breakers shall be the distributed phase type and shall accept plug-on circuit breakers.
 - b. <u>Short Circuit Current Ratings</u>: Shall be 22 kAIC.
- 4. BREAKERS
 - a. Circuit breakers shall be Square D type QO (plug-on) thermal magnetic trip, with an integral crossbar to ensure simultaneous opening of all poles in multi-pole circuit breakers.
 - b. Circuit breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication.
 - c. Handles shall have ON, OFF, and "Tripped" positions.

- d. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the circuit breaker case (through 125 amperes).
- e. Circuit breakers shall be UL listed in accordance with UL Standard 489 with current ratings as noted on the plans.
 - 1) Interrupting ratings shall be selected to provide the required load center short circuit current rating.
- f. Single-pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall have the SWD marking.
- g. Two- and three-pole circuit breakers 15-60 amperes intended for use with air conditioning, heating, and refrigeration equipment have motor group combinations and marked as such shall have the HACR marking.
- h. Provide UL-approved arc fault interrupter circuit breakers where serving outlets within apartment units.
- i. Provide combination arc fault interrupter/ground fault circuit breakers where noted on Drawings.

C. EXECUTION

- 1. LOAD CENTERS
 - a. Shall be anchored firmly to building structure.
 - 1) Firmly clamp all connections to the panel and infill all knock-outs which are not used.
- 2. SPLIT NUETRAL BAR
 - a. Provide split neutral bar for specialty circuit breaker connections.

26 24 16 - PANELBOARDS

- A. GENERAL
 - 1. SCOPE
 - a. Provide branch circuit panelboards as indicated by the Contract Documents.

2. REFERENCES

- a. GENERAL
 - 1) The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
 - a) <u>Federal Specifications (FS)</u>: FS W-C-375, "Circuit Breakers, Molded Case, Branch Circuit and Service."
 - b) <u>National Fire Protection Association (NFPA)</u>: NFPA 70, "National Electrical Code" (copyrighted by NFPA, ANSI approved) hereinafter referred to as NEC.
 - c) <u>Underwriters Laboratories, Inc. (UL)</u>:
 - (i) UL 98, "Standard for Enclosed and Dead-Front Switches" (copyrighted by UL, ANSI approved).
 - (ii) UL 489, "Standard for Molded-Case Circuit Breakers and Circuit Breaker Enclosures."
 - (iii) UL 891, "Standard for Dead-Front Switchboards" copyrighted by UL, ANSI approved).
- 3. SUBMITTALS
 - a. <u>Product Data</u>: Submit product data showing material proposed.
 - 1) Submit sufficient information to determine compliance with the Drawings and Specifications.
 - 2) Submit product data for each type of switchboard, overcurrent protective device, surge protective device, ground-fault protector, accessory, and component indicated.
 - a) Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
 - b. <u>Shop Drawings</u>: Submit shop drawings for each product and accessory required.
 - 1) Include information not fully detailed in manufacturer's standard product data.
 - 2) Submit shop drawings for each switchboard and related equipment.
 - a) Indicate front and side enclosure elevations with overall dimensions, conduit entrance locations and requirements, nameplate legends, one-line diagrams, equipment schedule and switchboard instrument details.
 - c. <u>Wiring Diagrams</u>: Submit wiring diagrams detailing power, signal, and control systems, clearly differentiating between manufacturer-installed wiring and field-

installed wiring, and between components provided by the manufacturer and those provided by others.

- d. <u>Quality Control Submittals</u>:
 - 1) <u>Test Reports</u>: Submit field quality control test reports.
- e. <u>Contract Closeout Submittals</u>:
 - 1) <u>Operation and Maintenance Data</u>: Submit operation and maintenance data for switchboards to include in operation and maintenance manuals specified in Division <u>1 GENERAL REQUIREMENTS</u>.
 - 2) <u>Warranty Data</u>: Submit manufacturer's standard warranty documents.

4. DELIVERY, STORAGE AND HANDLING

- a. Deliver materials to the project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- b. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
- 5. PROJECT CONDITIONS
 - a. <u>Environmental Requirements</u>: Do not install switchboards until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

B. MATERIALS

- 1. MANUFACTURERS
 - a. <u>Basis of Design</u>:
 - 1) Products specified shall be manufactured by Square D by Schneider Electric.
 - 2) Items specified are to establish a standard of quality for design, function, materials, and appearance.
 - Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2. MANUFACTURED UNITS

- a. <u>Panelboard</u>: Provide fixed, individually mounted main device, panel-mounted plug-on branches 1200 amperes and less, and sections front and rear aligned.
- b. <u>Main Bus Continuous</u>: Provide 400 ampere rating.
- c. <u>Short Circuit Current Rating</u>: 22 kA
- d. <u>Enclosure</u>: Provide steel enclosure, in compliance with UL 891, Type 1.

- e. <u>Enclosure Finish</u>: Provide factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- f. <u>Barriers</u>: Provide barriers between adjacent switchboard sections.
- g. <u>Insulation and isolation</u>: Provide taped bus for through bus.
- h. <u>Front Covers</u>: Front covers shall be screw removable with a single tool and doors shall be hinged with removable hinge pins.
- i. <u>Buses and Connections</u>: Three phase, four wire, unless otherwise indicated. Provide hard-drawn plated copper of 98% conductivity.
 - 1) Group-Mounted Feeder Vertical Bus Stack:
 - a) Bus stack shall be capable of mounting feeder breakers with different frame sizes and number of poles across from one another on the bus stack.
 - Non-conducting surface films shall be removed during circuit breaker installation by a wiping action of the circuit breaker jaws.
 - c) The design of the circuit breaker jaws and bus stack shall create blow-on forces under fault conditions.
 - d) Bolted lap joint connections for feeder breakers shall not be allowed for group-mounted feeders.
 - 2) <u>Ground Bus</u>: Size per current NEC and UL 891 Tables 28.1 and 28.2, hard-drawn copper of 98% conductivity, equipped with pressure connectors for feeder and branch circuit ground conductors.
 - a) For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.
 - 3) <u>Bus Composition</u>:
 - a) Plated copper.
 - (i) Plating shall be applied continuously to bus work.
 - (ii) The switchboard bussing shall be of sufficient crosssectional area to meet UL 891 temperature rise requirements.
 - (iii) The phase and neutral through-bus shall have an ampacity as shown on the Drawings.
 - (iv) For four-wire systems, the neutral shall be of equivalent ampacity as the phase bus bar.
 - (v) Tapered bus is not permitted.

3. OVERCURRENT PROTECTIVE DEVICES

- a. <u>Breaker Type</u>:
 - 1) Thermal magnetic/basic electronic circuit breakers.
- b. <u>Molded Case Circuit Breaker Features and Accessories</u>: Standard frame sizes, trip ratings, and number of poles.
 - 1) <u>Lugs</u>: Compression style, suitable for number, size, trip ratings, and conductor material.
 - 2) <u>Application Listing</u>: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
 - 3) <u>Ground Fault Protection</u>: Integral to circuit breaker with adjustable

pickup and time delay settings, push-to-test feature, and ground fault indicator.

- c. <u>Enclosed, Insulated Case Circuit Breaker</u>: Fully rated, encased power circuit breaker with interrupting capacity rating to meet available fault current.
 - 1) <u>Mounting</u>: Drawout circuit breaker mounting.
 - 2) <u>Closing:</u> Two-step, stored energy closing.
 - 3) <u>Trip Units</u>: Microprocessor-based trip units with interchangeable rating plug, LED trip indicators, and the following field-adjustable settings:
 - a) Instantaneous trip.
 - b) Long-time and short-time pickup levels.
 - c) Long-time and short-time time adjustments with I2t response.
 - d) Ground fault pickup level, time delay, and I2t response.

4. ACCESSORY COMPONENTS AND FEATURES

- a. Provide accessory set, including, but not limited to, tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- b. Provide one remote racking device for drawout circuit breakers.
- c. Provide overhead circuit breaker lifting device, mounted at top front of switchboard, with hoist and lifting yokes matching each drawout circuit breaker.

5. IDENTIFICATION

a. <u>Mimic Bus</u>: Provide an anodized aluminum or plastic engraved plaque. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic bus diagram. Produce a concise visual presentation of principal switchboard components and connections.

C. EXECUTION

- 1. INSTALLATION
 - a. <u>General</u>: Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.
 - 1) Install switchboards and accessories according to NEMA PB 2.1 and NECA 400.
 - 2) Install and anchor switchboards level on concrete bases, 4" (102 mm) nominal thickness.
 - 3) Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
 - 4) Frame and mount the printed basic operating instructions for switchboards, including, but not limited to, control and key interlocking sequences and emergency procedures.
 - a) Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic.
 - b) Mount on front of switchboards.
 - 5) Install overcurrent protective devices, surge protective devices, and instrumentation.
 - a) Set field-adjustable switches and circuit breaker trip ranges.

2. IDENTIFICATION

- a. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as needed.
- b. Label each switchboard compartment with engraved metal or laminated plastic nameplate mounted with corrosion-resistant screws.
- 3. FIELD QUALITY CONTROL
 - a. <u>Prepare for acceptance tests as follows</u>:
 - 1) Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
 - 2) Test continuity of each circuit.
 - b. <u>Perform the following field tests and inspections and prepare test reports</u>:
 - 1) Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. Certify compliance with test parameters.
 - 2) Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 4. PROTECTION
 - a. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the switchboards shall be without damage at time of Substantial Completion.

26 24 19 - MOTORS AND MOTOR PROTECTION

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Division 23 HEATING, VENTILATING AND AIR CONDITIONING.
 - 2. SCOPE
 - a. Motors shall be provided as part of equipment unless noted otherwise.
 - b. Motors shall be compatible with service provided.
 - c. Provide motor protection as required by National Electrical Code.

B. PRODUCTS

1. MATERIALS

Overload devices shall be manual reset type unless noted otherwise.

C. INSTALLATION

- 1. Provide final connection to all motors as indicated by the Contract Documents.
- 2. Size and install overload devices in accordance with manufacturer's and National Electrical Code requirements.
- 3. Provide thermal overload protection for all motors.
 - a. Where motors are not provided with internal thermal overload protection provide protection as a part of controller or disconnect.

26 27 73 - WIRED DOOR CHIMES

- A. GENERAL
 - 1. SCOPE
 - a. Furnish all labor and materials required to install wired door chime, pushbutton, transformer and any other items required for a complete installation at each sensory-impaired unit.

B. MATERIALS

- 1. DOOR CHIMES
 - a. Shall be Nutone Model BK110NBWH chime kit with pushbutton and transformer.
- 2. DOORBELL SIGNALER
 - a. Shall be Model DS800 doorbell signaler by Sonic Alert, Inc. with pushbutton.
 1) Locate as shown on plans.
- 3. DOORBELL REMOTE RECEIVERS
 - a. Shall be Model No. SA201 by Sonic Alert, Inc.
 - 1) Provide two (2) per sensory-impaired unit.
- 4. DOME LIGHTS (SENSORY-IMPAIRED UNITS)
 - a. Provide one (1) Tektone Ll381 light in each bathroom and at living room, interconnect to doorbell signaler.

C. INSTALLATION

- 1. GENERAL
 - a. Chime kit or doorbell signaler shall be installed in locations noted on the drawings in accordance with manufacturer's written instructions.
 - b. At fire-rated walls, items to be installed in electrical box approved for use in fire rated construction.
 - c. Prior to completion, turn over receivers to Owner's maintenance staff.

26 28 00 - OVERCURRENT PROTECTIVE DEVICES

A. GENERAL

- 1. SCOPE
 - a. Provide overcurrent protective devices including fuses and circuit breakers as indicated on the Drawings.
 - b. Circuit breakers to be of size and number of poles, and interrupting rating shown.
 - c. Fuses to be of the classes and types required for the application by the National Electrical Code.
 - d. All devices must be UL listed and comply with applicable NEMA and UL requirements.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURES
 - a. <u>Circuit Breakers</u>:
 - 1) Square D.
 - 2) General Electric.
 - 3) Siemens.
 - 4) Cutler/Hammer.
 - 5) Approved Equal
 - b. Fuses (600V or less):
 - 1) Bussman.
 - 2) Gould.
 - 3) Littelfuse.
 - 4) Approved Equal.
- 2. MATERIALS
 - a. Molded case circuit breakers to have toggle-type, quick-make, quick-break action. Breakers to be calibrated for operation in an ambient temperature of 40° C.
 - 1) Each circuit breaker to have trip indication by handle position.
 - 2) Two and three pole breakers to be common trip.
 - 3) Each circuit breaker to have individual thermal and magnetic trip elements in each pole.
 - 4) Circuit breakers with frame sizes greater than 100 amperes to have variable magnetic elements which are set by a single adjustment (to assure uniform tripping characteristics in each pole).
 - 5) Circuit breakers to have minimum interrupting capacity of 10,000 amps RMS asymmetrical, or as noted on the plans.
 - b. Individually mounted circuit breakers to be furnished in NEMA 1 General Purpose Enclosures (NEMA 3R when located outside building), unless otherwise noted or required to suit the application.
 - c. Circuit breakers used as switches in Fluorescent lighting circuits shall be listed and shall be marked as SWD or HID.
1) Circuit breakers used in High-Intensity Discharge lighting circuits shall be marked as HID.

C. EXECUTION

- 1. INSTALLATION
 - a. Install fuses and circuit breakers where shown on the Plans and provide three (3) spare fuses if each size and type installed.
 - b. Coordinate fuse sizes with actual equipment provided

26 28 01 - GROUND FAULT PROTECTION

A. GENERAL

- 1. SCOPE
 - a. The ground fault protection described herein is intended for use on 208-volt, three (3) phase, four (4) wire solidly grounded, wye, low-resistance, grounded 60 Hertz single service system.
 - b. Ground fault protection equipment shall consist of a ground sensor encircling all phase conductors-including neutral in a four (4) wire system, connected to a solid-state ground relay which initiates tripping of the feeder circuit interrupting device.
 - 1) Ground protection shall be adjustable from 200 to 2000 primary amperes and time-current characteristics shall provide .1, .2, .3 or .4 (manufacturer to make selection) second operation at about ten (10) times setting.
 - 2) Circuit interrupter shunt trip and relay shall operate from a 120-volt control source.
 - 3) Case shall be of the draw-out front panel mounted type.
- B. PRODUCTS
 - 1. MATERIALS
 - a. Shall be of the same manufacturer as the main switchgear.
- C. EXECUTION
 - 1. INSTALLATION
 - a. Ground fault protection equipment shall be installed as an integral component of the main switchgear.

26 28 15 - STARTERS AND CONTACTORS

A. GENERAL

- 1. SCOPE
 - a. Provide lighting contactors, motor starters and relays as indicated by the Contract Documents.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. Square D.
 - b. General Electric.
 - c. Cutler Hammer.
- 2. MATERIALS
 - a. Equipment shall meet the requirements of NEMA or IEC and shall be UL listed and CSA certified.
 - b. Terminals for conductors must be UL listed as suitable for the type of conductor specified.
 - c. Enclosure shall be of the proper NEMA type to suit the particular application as follows:
 - 1) <u>General Indoor Service</u>: NEMA 1.
 - 2) <u>Outdoor, Damp or Wet Area Service</u>: NEMA 3R.
 - d. Motor Starters:

1)

- Starters shall be solid state overload relay:
 - a) Square "D" Motor Logic Class 9065
 - b) Or equal.
- 2) Starters shall have a three to one adjustment for trip current, phase loss and unbalance protection.
 - a) Trip Class 1020 of the type indicated on the drawing and sized as required for the equipment served.
- 3) Provide Hand/Off/Auto control and red/on green/off pilot lights with each starter.
- 4) Provide minimum (2) NO and (2) N/C contacts.
 - Verify and provide additional normally open and normally closed control contacts and terminations as required for the particular application.
- 5) Provide control transformers as required for the particular application.
- C. EXECUTION
 - 1. INSTALLATION
 - a. Install where shown on the drawings.

- b. Coordinate control requirements with the equipment being served.
- c. Protect equipment during construction to prevent damage, entry of foreign materials, etc.

26 50 00 - LIGHT FIXTURES

- A. GENERAL
 - 1. SCOPE
 - a. Provide and install all light fixtures, and related equipment and components, including all lamps, necessary to make a complete and operating lighting system as indicated on the drawings.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. Furnish lighting fixtures and/or luminaries in accordance with the type listed on the drawings.
- 2. MATERIALS
 - a. Furnish lighting equipment complete with suspension accessories, casings, sockets, holders, reflectors, ballasts, diffusing material, louvers, mounting frames, recessing boxes, etc., all wired and assembled as required for the particular lighting outlet and bearing a UL label.
 - b. Fluorescent light fixtures to be designed to limit ballast case temperature to 90°C maximum.
 - 1) All ballast studs to be permanently fastened to the fixture.
 - 2) Recessed fluorescent fixtures to be suitable for the type of ceiling and suspension system installed.
 - c. All fixture prismatic diffusers to be 100% virgin acrylic prismatic with a minimum thickness of 0.156" except as noted.
- 3. BALLASTS
 - a. <u>Acceptable Manufacturers</u>:
 - 1) General Electric
 - 2) Advance
 - 3) Universal
 - 4) Jefferson
 - 5) Motorola
 - 6) Valmont
 - 7) Magnetek
 - 8) Venture
 - b. Fluorescent ballasts to be electronic rapid start or instant start, THD less than 10%, CBM certified, Class P rated, with an "A" sound rating.
 - c. Ballasts shall be internally thermal protected.
 - d. All ballasts shall be UL listed.
- 4. LAMPS

- a. <u>Acceptable Manufacturers</u>:
 - 1) Phillips.
 - 2) General Electric.
 - 3) Osram/Sylvania.
 - 4) Duro-Test.
 - 5) Venture.
- b. Lamps shall be 120V, 3000k, 85 CRI unless noted otherwise.
- c. All lamps shall bear the manufacturer's name, model number and voltage rating.
- d. Coordinate ballast operated lamps with actual ballast provided for proper operation.
 - 1) Where tandem operation is indicated, provide correct number of ballasts in affected fixtures.
- 5. FIXTURE SCHEDULE
 - a. Refer to drawings.

C. EXECUTION

- 1. INSTALLATION
 - a. Install light fixtures and related appurtenances where shown on the drawings.
 - 1) Mounting types and exact locations to be derived from reflected ceiling plans and coordinated with ceiling type and mechanical equipment locations.
 - 2) Report conflicts to the Architect before proceeding.
 - b. Where lay-in type light fixtures are used, furnish and install a minimum of four (4) grid support clips per fixture (or as required for adequate support of fixture).
 - 1) Fixtures shall also be supported from the structure by two (2) ceiling support wires affixed to opposite corners of the fixture.
 - c. Refer to the drawings for various types of ceiling construction.
 - 1) Provide required mounting apparatus for each ceiling type.
 - d. All fixtures must be clean and lamped at time of acceptance by Owner.

27 10 00 - STRUCTURED COMMUNICATION WIRING

- A. GENERAL
 - 1. SCOPE
 - a. This section includes the following:
 - 1) Phone/data infrastructure for Offices and Media Room.
 - 2) Phone/data infrastructure for apartments.

2. SYSTEM DESCRIPTION

- a. The structured data and voice cabling system will support voice and data. All systems will be star wired.
 - 1) Data and Voice Infrastructure at Common Areas and Computer Room:
 - a) The data and voice cabling will consist of one UTP cable installed from each jack location to the router location.
 - b) Where space includes an acoustical ceiling, provide 3/4" conduit stub above the ceiling.
 - 2) <u>Data and Voice Infrastructure for Apartments</u>: shall be installed wiring to each unit device location.

3. PERFORMANCE

- a. The data and voice infrastructure will be CAT6, capable of transporting 1GB Ethernet and will be tested with equipment that is compliant for the current standards at time of installation.
- 4. DEVICES
 - a. Subcontractor to install wire to each device location and leave a coil for future termination to the device to be installed by others.
 - b. At Telecom Rooms provide separate bundles of wire servicing each Apartment, with adequate coil length to make connection to the telephone punch blocking or system routers.
- 5. SUBMITTALS
 - a. Submit product data under provisions of Division <u>1 GENERAL REQUIREMENTS</u>.
 - b. Illustrations and scale drawing of the equipment rack and special cabinets.
 - 1) Drawings shall include designations, dimensions, etc.

6. PROJECT RECORD DRAWINGS

- a. Submit documents under the provisions of Section <u>01 33 00 SUBMITTAL</u> <u>PROCEDURES</u>
- b. All Rough-In drawings to be revised to "As-Built" status at the project completion. Submit one (1) complete set of prints and all files on AutoCAD 2010. Drawings are to show:
 - 1) All changes to the Contract Documents.

- 2) Actual locations of all equipment, pull boxes, terminal cabinets, terminations, and wiring.
- 3) Tag numbers of all of the cables.

7. REGULATORY REQUIREMENTS

- a. All work shall conform to or exceed the minimum requirements of the current state amendments, and all federal, state, local municipal codes and ordinances.
 - 1) This Contractor shall comply with the directors of all properly appointed authorities having jurisdiction.
- b. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purposes specified and shown.

8. EQUIPMENT AND MATERIALS

- a. All equipment and materials are to be new and of modern design.
- b. If any specified equipment model number is obsolete or superseded, provide the newest equivalent model.
- c. All equipment shall conform to appropriate UL/CSA listings.

B. PRODUCTS

- 1. APPROVED PRODUCTS
 - a. <u>Copper Cable Manufacturers</u>:
 1) Superior Essex, Mohawk, Berk-Tek, Belden, CommScope, and General
 - b. <u>Copper Termination Product Manufacturers (By others):</u>
 - 1) Hubbell, Leviton, Panduit, Ortronics, and CommScope

2. DATA AND VOICE INFRASTRUCTURE

- a. <u>Data and Voice Cable at Common Areas</u>: All four (4) pair Category 6 cables shall conform to TIA/EIA 568B.21Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section, and be part of the LAN Certification and Follow-up Program.
 - 1) Cables shall be marked as ETL verified Category 6 component compliant.
 - 2) Applications standards supported should include, but be not limited to:
 - a) IEEE 802.326, 1Base5, 10BASE-T
 - b) IEEE 802.5, 4 Mbps, 16Mbps (328 ft 104 Workstations), TP-PMD, 100 Base –T, 1000Base-T, 155 Mbps ATM, and future high-speed applications.
 - c) Plenum-rated Category 6 Unshielded Twisted Pair (UTP) cable shall be composed of 23 AWG bare solid-copper conductors.
 - d) All CAT6 cable will be BerkTek LANmark 2000, Part Number 10032251 or equal by other pre-approved manufacturer.
- b. <u>Data and Voice Cable at Apartments</u>: Shall be CAT 5e.
- c. <u>Patch Panels (Common Areas)</u>: All CAT 6 patch panels shall conform to TIA/EIA

568B.2-1 Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section, and be part of the ULÒ LAN Certification and Followup Program.

- 1) CAT 6 patch panels shall be ETL verified Category 6 component compliant.
- 2) All CAT 6 patch panels shall be RJ45 to 110 IDC and be provided in 24 and/or 48 port sizes required to terminate all horizontal cables with an additional 10 % spare.
- 3) CAT 6 patch panels will be Hubbell NEXTSPEED Part Numbers P6E24U and P6E48U or equal by other pre-approved manufacturer.
- 4) Patch panels by E.C.
- d. <u>Data/Phone/CATV Jacks (Apartments) (By others)</u>: Shall be one (1) RJ45 data, one (1) phone, and one (1) cable outlet by Hubbell Wiring Device-Kellems.
- e. <u>Apartment Structured Interface</u>: Shall be Channel Vision #C-2044 or Architectapproved equal.
- f. <u>Cable Supports</u>: All cable supports shall be "J Hooks" and shall be installed no farther than 5' apart or as noted on Drawings.
 - 1) In addition to supports called for on the Drawings, Architect-approved equal products by Caddy CableCat series supports are approved.

C. EXECUTION

- 1. GENERAL
 - a. Perform this work in accordance with acknowledged industry and professional standards and practices, and the procedures specified herein.
 - b. Furnish and install all materials, devices, components, and equipment for a complete, operational system.
 - c. Maintain a competent supervisory and supporting technical personnel during the entire installation.
 - 1) Change of the supervisor during the project shall not be acceptable without prior written approval from the Owner.

2. INSTALLATION OF THE SYSTEM

- a. Obtain and pay for all permits and inspections required by all legal authorities and agencies having jurisdiction for the work.
 - 1) This shall be a part of the work of the contractor performing the work requiring the permit or inspection.
- b. All final connections shall be by others.
- c. Securely mount equipment plumb and square in place.
 - 1) Where equipment is installed in cabinets, provide mounting bolts in all equipment fastening holes.
- 3. ACCEPTANCE BY OWNER

- a. System approval and acceptance will occur at the end of the final testing and demonstration of each system.
- b. In the event that during the final testing and demonstration, the system requires further adjustments or work, the Contractor is to provide the Owner with a new expected completion date.
 - 1) Any additional costs, including additional consulting fees, to provide an acceptable system will be at the expense of the Contractor.

27 41 00 - TELEVISION SYSTEM

A. GENERAL

1. SCOPE

a. Provide and install television system as shown on electrical drawings and/or as required for a complete installation except as noted below.

2. JOB REQUIREMENTS

a. All workmanship and materials shall conform to standards acceptable to the local cable/satellite television provider.

3. SHOP DRAWINGS

a. Submit material and equipment cuts to Architect for review and approval showing all data necessary to confirm compliance with these specifications.

4. IDENTIFICATION

a. Verify final room numbers for use by this Contractor prior to labeling wiring.

5. COORDINATION

- a. Install cable television wire for each television room to each device location on the floor.
 - 1) Work to be performed concurrently with rough-in of all MPE items.

B. MATERIALS

- 1. TV OUTLETS
 - a. TV outlets and cover plates shall be installed buy the Owner.

2. TELEVISION CABLE TO OUTLETS

- a. Shall be RG6; West Penn #841.
- 3. TELEVISION CABLE TO EXTERIOR CONNECTION POINT
 - a. Television cable between telecom room shall be by the Cable supplier.
- 4. CABLE TV SPLITTER
 - a. Shall be:
 - 1) Blonder Tongue SUV-x or Architect approved equal.
- 5. CAMERA SYSTEM MODULATOR
 - a. Provide digital modulator for connection at the lobby entry panel CCTV feed to a dedicated channel.
 - 1) Channel to be selected by the Cable TV utility.
- 6. TELEVISION WIRING SYSTEM

- a. All apartments and other locations noted on the drawings are to be wired for cable/satellite television by this Contractor as shown on the drawings and/or as herein specified.
 - 1) Provide coiled wire within the box to allow for connection to the device.
- b. Each cable/satellite television outlet is to be run directly to termination point in distribution box in Telecom Rooms.
 - 1) Do not "loop" outlets together.
 - 2) At termination, each cable is to be identified with room name and tied to phone cable of the same apartment.
- c. All conductors will be concealed within the building construction.
- d. Provide sealant at all wall and ceiling penetrations.
- e. TV outlet heights shall match the receptacle height.

28 15 23 - ENTRY/INTERCOM SYSTEM

- A. GENERAL
 - 1. RELATED DOCUMENTS
 - a. Section <u>28 23 00 SECURITY/SURVEILLANCE SYSTEM</u>.
 - 2. SCOPE
 - a. Furnish and install a complete microprocessor controlled, "full-duplex" circuitry voice communication, telephone intercom system as described herein and shown on the plans.
 - 1) The system shall include all necessary control boards, power supplies, keypads, loudspeakers, special mounting boxes, cable, connectors, and accessories for a complete operational communication system.
 - b. Scope of work shall include on-site telephone voice communication from an entry location to each resident telephone regardless whether resident has third party phone service or not.
 - 1) System shall provide the resident with the ability to grant or deny a guest access via their (resident) telephone by depressing a touch-tone button on their telephone.

3. REFERENCE STANDARDS

- a. Underwriter Laboratories Inc. (UL), UL 294.
- b. Telephone intercom system shall be tested for compliance to UL 294 and shall be LISTED by a Nationally Recognized Testing Laboratory (NRTL).
- c. Federal Communications Commission (FCC) DUF6VT-12874-OT-T.
- d. Department of Commerce (DOC) (CAN) 1736 4530 A.
- 4. SUBMITTALS
 - a. <u>Provisions</u>: Comply with Section <u>01 33 00 SUBMITTAL PROCEDURES</u>.
 - b. Shall include an equipment list, and data sheet, system description and block diagrams on equipment to be finished.
 - c. Shop drawings shall be provided indicating line diagrams of system configuration.
- 5. WARRANTY
 - a. Systems shall include a factory warranty that equipment is free from defects in design, material, manufacturing and operation.
 - Factory warranty period shall be for 2 years parts and workmanship; twenty-four (24) months
 from date of shipment.

- 1) Manufacturer shall not be responsible for improper use, handling, or installation of the product.
- c. Installing communications contractor shall guarantee the equipment, wire, cable, and installation for twelve (12) months from date of Substantial Completion.

B. PRODUCTS

- 1. ACCEPTABLE MANUFACTURERS
 - a. The system as described herein is based on the Model 1816 system manufactured by DoorKing, Inc., Inglewood, California.
 - b. Similar products by Mircom Series TX 3-120C-A are approved.
 - 1) Products meeting or exceeding the specifications may be submitted as a substitution request for Architect review.

2. SYSTEM DESCRIPTION

- a. The system shall be a microprocessor-based system and shall provide voice communication and control by interfacing directly with existing telephone lines for connection to resident telephones.
 - Communication to/from and control of the guest entry door/gate shall be provided regardless whether residents have third party phone service or not.
 - 2) The system shall be capable of "full-duplex," hands-free operation, without the use of handsets, at the initiating/guest, door, gate station or Lobby/entry panel.
- b. The scope of the system shall include all necessary components for proper function and interface to existing telephone lines, and include all features and functions described herein and the equipment shown on the plans.
 - 1) System shall be capable of adding optional features, equipment and interfaces listed in the Specifications, even if not initially included or shown on the plans.
- c. A complete operational system shall be provided.

3. SYSTEM CONFIGURATION

- a. The system is designed so that third party telephone service is not required by residents for Apartment to Lobby communication and control.
- b. A complete system shall consist of a main control cabinet, a decoder board, phone line relay board, connecting cable, RJ71C phone block, Lobby panel, and:
 - 1) One RJ71C phone block, one line interface board and one connecting cable are required for every twelve (12) phone lines that the system is to interface with.
 - 2) Auxiliary cabinets are added as relay board usage increases.
 - 3) RJ71C phone blocks shall be used to interface telephone line wiring with the telephone intercom system.
 - 4) Connecting cables shall be used to route all telephone lines from the

RJ71C phone blocks through the systems relay boards and control cabinets.

- 5) Wiring from the main control cabinet to the Lobby panel shall consist of a single pair, twisted phone line.
- c. The system's programmable features shall be retained in EEPROM memory, which guarantees that programmed data is not lost during power outages or chip removal.
- d. Connections for a doorman/concierge telephone shall be provided at the Reception Desk.
- e. Main control cabinet and auxiliary cabinets are surface mounted.
 - 1) Lobby panels shall be surface, flush or wall mounted as shown on the plans.

4. STANDARD SYSTEM FEATURES

- a. The system does not require a dedicated phone line for Lobby panel to resident communication, and residents do not require third party phone service to be connected to the system.
 - System shall interface with thirty-two (32) resident telephones and one (1) manager telephone and one (1) maintenance office phone along with the one (1) concierge phone in the reception area.
- b. The phone lines interface with the 1816 system by use of RJ71C telephone blocks, which provide a convenient method to route all phone lines through the system.
 - 1) One (1) RJ71C block is required for every twelve (12) phone lines that the system is to interface with.
- c. The telephone intercom system shall use a double ring to differentiate between incoming calls and Lobby panel calls.
 - 1) The system shall provide call waiting between Lobby panel calls and incoming calls.
- d. The system shall use a DoorKing Model No. 1803-084 "S" front Lobby panel with integral CCTV camera, DoorKing Model No. 1812-145, connected to security surveillance system and connected to cable TV system to allow viewing by residents.
- e. Four (4) digit directory codes are used by guest to connect the Lobby phone to a resident's phone.

5. DOORMAN/CONCIERGE FEATURES

- a. The system shall be provided with an input for a concierge telephone at the Reception Desk, which shall be capable of the following:
 - 1) To call a tenant without using the front Lobby panel.
 - 2) Program the system using a special access code.
- 6. EQUIPMENT
 - a. <u>Main Control Cabinet</u>:

- 1) The large main control cabinet (p/n 1816-080) shall house the main control board, one decoder board, and up to 13-line relay boards to serve as many as one hundred fifty-six (156) units.
 - a) If more than one hundred fifty-six (156) units are present, add auxiliary cabinets as required.
- 2) The small main control cabinet (p/n 1816-082) shall house the main control board and up to 5-line relay boards to serve up to sixty (60) units.
 - a) If more than 5-line relay boards, sixty (60) units are required for an installation, use the large main control cabinet.
- b. <u>Auxiliary Cabinets (Use if installation requires additional line relay boards)</u>: Large auxiliary cabinet (p/n 1816-081) can house up to 16-line relay boards and two decoder boards to serve an additional one hundred ninety-two (192) units.
 - 1) Auxiliary cabinets can be added as required to house additional line relay boards (maximum 100-line relay boards).
- c. <u>Line Relay Board</u>:
 - 1) Each line relay board can accommodate up to twelve (12) units.
 - a) Divide the total number of units by twelve (12) and round up to the nearest whole number to determine the number of line relay boards required for the installation.
 - 2) The line interface board (p/n 1892-010) provides communication from the Lobby panel to each resident.
- d. <u>RJ71C Phone Block (Minimum 1 Required)</u>: One (1) RJ71C phone block (p/n 1816-046) is required for each line relay board used in the system.
- e. <u>Connecting Cable (Minimum 1 Required)</u>: One (1) connecting cable (p/n 1882-042) is required for each line relay board used in the system.
- f. <u>Decoder Board</u>: Decoder boards (p/n 1881-010) are required after the first 5line relay boards, and one additional Decoder Board is required for every 8-line relay boards used thereafter.
- g. Lobby Panel:
 - 1) Shall be DoorKing Telephone Entry Systems Model No. 1803-134, flush mounted.
 - a) Integral Camera: Include color CCTV camera.
 - b) <u>Directory</u>: Provide wall-mounted pager directory holder.
 - (i) DoorKing 0701 at two (2) units for a total of forty (40) spaces.
- h. <u>Tenant Telephone</u>: Contractor to furnish and install one (1) wall-mounted touchtone telephone at each residential unit.

C. EXECUTION

- 1. INSTALLATION
 - a. Should be installed by qualified technicians who have been factory trained.
 - b. Wiring shall be uniform and in accordance with national electric codes and manufacturer's instructions.

- 1) Telephone lines from the dwelling to distribution panel shall serve as the connection to the unit phone.
- c. Conform with the manufacturer's written requirements for installation.
 - 1) One (1) RJ71C phone block must be installed for every twelve (12) phone lines that the system is to interface with.
 - 2) One (1) relay board and connecting cable must be used for every RJ71C installed.
 - 3) The main control cabinets and auxiliary cabinets are to be installed in close proximity to the RJ71C phone blocks to simplify system wiring and installation.
- d. Equipment shall be firmly secured, plumb, and level.
 - 1) Mount Lobby entry panel so that the top of panel is 48" a.f.f.
- e. All splices shall be in easily accessible junction boxes or on terminal boards.
- f. All cable runs at the main control cabinets, in all auxiliary cabinets and at all phone blocks shall be tagged and identified.
- g. Coordinate all work with other effected trades and contractors.
- h. Connect integral CCTV camera at Lobby panel to building surveillance system and modulate for viewing by residents at each dwelling unit via building cable TV system.
- 2. SYSTEM INITIALIZING AND PROGRAMMING
 - a. System shall include all software and/or instructions necessary for system configuration.
 - b. System shall be turned on and adjustment made to meet requirements of specifications and on-site conditions.
 - c. System shall be programmed to function as specified.
 - d. Directory numbers, feature codes, and special programming shall be documented, printed and made available to all Owners.
- 3. SYSTEM TEST PROCEDURES
 - a. System shall be completely tested to assure that the exchange and all components, stations, speakers, and accessories are hooked up and in working order.
 - b. System shall be pre-tested by Contractor and certified to function in accordance with plans and specifications.
 - c. System shall be tested in presence of Owner's representative.
- 4. OWNER INSTRUCTIONS

- a. Installation contractor shall conduct up to four (4) hours of instruction in use and operation of the system to designated Owner representatives, within thirty (30) days of acceptance.
- b. Installation contractor shall conduct up to four (4) hours of technical training, in programming, troubleshooting, and service of the system, to designated Owner representatives within ninety (90) days of system acceptance.
- c. Manufacturer shall conduct periodic, every ninety (90) days, technical training seminars and make them available to those responsible for ongoing maintenance of the system.

5. MANUALS AND DRAWINGS

- a. Contractor shall provide Owner with standard factory prepared operation, installation and maintenance manuals.
 - 1) Manuals shall include typical wiring diagrams.
- b. Contractor shall provide Owner with risers, layouts, and special wiring diagrams showing any changes to standard drawings, if required on project.

28 23 00 - SECURITY/SURVEILLANCE SYSTEM

A. GENERAL

- 1. SCOPE
 - a. Furnish and install a new video surveillance system as shown and as required for a complete installation.

2. JOB REQUIREMENTS

- a. System supplier shall review device locations with the Architect prior to system rough in to confirm adequacy of the device locations to cover the building.
 - 1) Following review adjust device locations as required.

B. MATERIALS

- 1. SURVEILLANCE SYSTEM
 - a. Surveillance system shall be manufactured by Sony Video Surveillance Systems, Panasonic or Axis Communications.
 - 1) System shall be monitored from Manager's Office.
 - b. <u>IP Exterior Cameras</u>: Shall have 1280 x 960 resolution, vandal resistant enclosure, wide angle varifocal lense and electrical day/night IP mode.
 - c. <u>Network Surveillance Server</u>: Shall have 2 TB storage capacity, support up to thirty-nine (39) cameras, provide video compression.
 - d. <u>Monitor</u>: 24" LCD or larger.
 - e. <u>Provide new cameras at each existing camera location and install new cameras</u> in the following locations:
 - 1) Ground floor vestibule (view of exterior doors).
 - 2) One (1) camera with view of stair door (exterior side).
 - 3) One (1) camera with view of corridor exterior door (exterior side).
 - f. Door/intercom CCTV camera shall be monitored by surveillance system.

C. INSTALLATION

- 1. Install surveillance system in accordance with manufacturer's instructions.
- 2. Installation of cameras shall be mounted to existing construction.
 - a. Provide conduit, mounting, housings, etc. as necessary for complete installation.
 - b. Coordinate final camera location with Owner/Architect prior to installation.
 - c. Confirm server and monitor location with Owner/Architect.
- 3. Provide training for building management personnel prior to project completion.

28 46 00 - FIRE ALARM SYSTEM

A. GENERAL

- 1. SCOPE
 - a. This section covers installation of a new intelligent reporting, microprocessor controlled fire alarm system, including initiating devices, notification appliances, controls and supervisory devices.
 - b. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
 - c. The fire alarm equipment and wiring will be furnished and installed by the electrical contractor.

2. SYSTEM WIRING

- a. Provide 18 AWG shielded twisted pair to each new device.
 - 1) Signal wire shall be two conductor, 14 AWG fire alarm signal wire.
- b. Wiring shall be in accordance with the requirements of the National Electrical Code and NFPA.
- c. The fire alarm system, including raceways and wiring, shall be completely installed and wiring shall be properly tagged and color coded.
- d. The electrical contractor shall make final connections as shown and required by the equipment manufacturer's wiring instructions, coordinate as required.

3. SYSTEM INTERFACES

- a. The complete fire alarm system must interface with the building electronic access control system.
 - 1) Activation of the fire alarm system shall cause the access control system to release all doors.
 - 2) Activation of fire alarm system shall cause all fire smoke dampers in the building to close and allow opening only upon clearing of the alarm at the FACP.

4. SYSTEM TEST

- a. The manufacturer's authorized representative shall perform a quality inspection of the final installation and in the presence of the electrical contractor and Owner's representatives, shall perform a complete functional test of the system, including sound test of horn devices.
- b. A system certification verifying the proper system operation shall be required prior to acceptance.

5. SYSTEM QUARANTEE

a. All new components, and parts shall be guaranteed against defects in materials

and workmanship for a period of twelve (12) months from the date of final acceptance by the Owner, provided such defects are not caused by misuse, abuse, neglect, or unauthorized tampering.

b. Warranty service shall be provided by a qualified factory-trained representative of the equipment manufacturer.

6. DESCRIPTION

- a. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system.
 - 1) It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.
- b. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification.
 - 1) The system shall be electrically supervised and monitor the integrity of all conductors.
- c. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).
- d. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
- e. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

7. BASIC PERFORMANCE

- a. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
- b. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style A) as part of an addressable device connected by the SLC Circuit.
- c. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuit
- d. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
- e. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded
- f. NAC horn/strobe circuits shall be arranged such that there is a minimum of one

(1) horn/strobe circuit per floor of the building or smoke zone whichever is greater.

- g. NAC expander panels shall be electrically supervised for normal and abnormal conditions.
 - 1) Size panels to power all visual devices called for on the Drawings and for future devices at all apartments in the building.
- h. NAC horn/strobe circuits and control equipment shall be arranged such that loss of any one circuit will not cause the loss of any other horn/strobe circuit in the system.
- i. Provide visual devices in all sensory-impaired and accessible unit living room, bedroom and bathrooms.
- j. All circuits shall be power-limited, UL864 9th edition requirements.
- k. Provide 520 Hertz sounders in sleeping area per code.

8. BASIC SYSTEM FUNCTIONAL OPERATION

- a. When a fire alarm condition is detected and reported by one of the system's initiating devices, the following functions shall immediately occur:
 - 1) The system alarm LED on the system display shall flash.
 - 2) A local piezo electric signal in the control panel shall sound.
 - 3) A backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
 - 4) Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
- b. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

9. SUBMITTALS

- a. Two (2) copies of all submittals shall be submitted to the Architect for review.
- b. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.
 - 1) Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
- c. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.
- d. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

- e. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
- f. Show annunciator layout, configurations, and terminations.
- g. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
- h. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
- i. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
- j. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes.
 - 1) Response time of the technician to the site shall not exceed four (4) hours.
- k. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site.
 - 1) Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones.
 - 2) The system structure and software shall place no limit on the type or extent of software modifications on-site.

10. CERTIFICATIONS

a. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

11. GUARANTEE

- a. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least 1 year from the date of acceptance.
 - 1) The full cost of maintenance, labor and materials required to correct any defect during this 1-year period shall be included in the submittal bid.

12. APPLICABLE STANDARDS, SPECIFICATIONS AND APPROVALS

- a. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.
 - 1) <u>National Fire Protection Association (NFPA) USA</u>:
 - a) No. 13+ BR Sprinkler Systems
 - b) No. 72 National Fire Alarm Code
 - c) No. 101 Life Safety Code

- 2) <u>Underwriters Laboratories Inc. (UL) USA</u>:
 - a) No. 268 Smoke Detectors for Fire Protective Signaling Systems
 - b) No. 864 Control Units for Fire Protective Signaling Systems
 - c) No. 521 Heat Detectors for Fire Protective Signaling Systems
 - 2) No. 464 Audible Signaling Appliances
 - 3) No. 38 Manually Actuated Signaling Boxes
 - 4) No. 346 Waterflow Indicators for Fire Protective Signaling Systems
 - 5) No. 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems
 - 6) No. 1971 Visual Notification Appliances
- 3) Local and State Building Codes.
- 4) All requirements of the Authority Having Jurisdiction (AHJ).
- 5) The system shall have proper listing and/or approval from the following nationally recognized agencies:
 - a) UL Underwriters Laboratories Inc
 - b) ULC Underwriters Laboratories Canada
- 6) The fire alarm control panel shall meet UL Standard 864 (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

B. PRODUCTS

- 1. EQUIPMENT AND MATERIAL, GENERAL
 - a. All equipment and components shall be new, and the manufacturer's current model.
 - b. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.
 - c. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.
 - 1) Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
 - d. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings).
 - 1) Fasteners and supports shall be adequate to support the required load.

2. CONDUIT AND WIRE

a. <u>Conduit</u>:

2)

- 1) Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
 - Where required, all wiring shall be installed in conduit or raceway.
 - a) Conduit fill shall not exceed 40% of interior cross-sectional area where three (3) or more cables are contained within a single conduit.
- Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760.

- 4) Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits.
 - All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- 5) Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
- 6) Conduit shall be 3/4" minimum.
- b. <u>Wire</u>:
 - 1) All fire alarm system wiring shall be new.
 - 2) Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system.
 - a) Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits, Signaling Line Circuits Notification Appliance Circuits.
 - 3) All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
 - 4) Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
 - 5) Wiring used for the multiplex communication circuit (SLC) shall be twisted and unshielded and support a minimum wiring distance of 12,500'.
 - a) The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.
 - 6) All field wiring shall be electrically supervised for open circuit and ground fault.
 - 7) The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems that do not allow or have restrictions in, for example, the amount of t-taps, length of t-taps etc., are not acceptable.

3. TERMINAL BOXES, JUNCTION BOXES AND CABINETS

- a. All boxes and cabinets shall be UL listed for their use and purpose.
- b. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow).
 - 1) Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
- c. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum twenty (20) amperes.
 - 1) This circuit shall be labeled at the main power distribution panel as FIRE ALARM.
 - 2) Fire alarm control panel primary power wiring shall be 12 AWG.
 - 3) The control panel cabinet shall be grounded securely to either a coldwater pipe or grounding rod.
- 4. MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE

- a. Main FACP or network node shall be a NOTIFIER Model NFS2-640 and shall contain a microprocessor based Central Processing Unit (CPU) and power supply in a single board design or equal by Simplex, Harrington Signal or Siemens Building Technology.
 - 1) The CPU shall communicate with and control the following types of equipment used to make up the system:
 - a) Intelligent addressable smoke and thermal (heat) detectors.
 - b) Addressable modules.
 - c) Printer.
 - d) Annunciators.
 - e) Other system-controlled devices.
- b. <u>Operator Control:</u>
 - 1) <u>Acknowledge Switch</u>:
 - Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode.
 - (i) If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition.
 - b) Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
 - 2) <u>Alarm Silence Switch:</u> Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition.
 - a) The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards.
 - (i) The FACP software shall include silence inhibit and auto-silence timers.
- c. <u>Alarm Activate (Drill) Switch</u>:
 - 1) The Alarm Activate switch shall activate all notification appliance circuits.
 - 2) The drill function shall latch until the panel is silenced or reset.
- d. <u>System Reset Switch</u>: Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
- e. <u>Lamp Test</u>: The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal
- f. <u>System Capacity and General Operation</u>:
 - Control panel or each network node shall provide or be capable of expansion above the number of devices shown on the Drawings or required plus an additional 30% capacity.
 - a) For purposes of this calculation, all devices within units, including those which are roughed in for future installation, shall be included.
 - 2) The control panel or each network node shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps at 30 VDC.

- It shall also include four (4) Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
- 4) The Notification Appliance Circuits shall be programable to Synchronize with System Sensor, Gentex and Wheelock Notification Appliances.
- 5) The system shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad with easy touch rubber keys for the field programming and control of the fire alarm system.
- 6) The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers.
 - a) It shall not require replacement of memory ICs to facilitate programming changes.
- 7) The system shall allow the programming of any input to activate any output or group of outputs.
 - a) Systems that have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.
- 8) The FACP shall support up to 20 logic equations, including "and," "or," and "not," or time delay equations to be used for advanced programming.
 - a) Logic equations shall require the use of a PC with a software utility designed for programming.
- g. <u>The FACP or each network node shall provide the following features:</u>
 - 1) Drift compensation to extend detector accuracy over life.
 - a) Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
 - 2) Detector sensitivity test, meeting requirements of NFPA 72.
 - 3) Maintenance alert, with two (2) levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
 - 4) Nine (9) sensitivity levels for alarm, selected by detector.
 - a) The alarm level range shall be .5% to 2.35% per foot for photoelectric detectors and 0.5% to 2.5% per foot for ionization detectors.
 - b) The system shall also support sensitive advanced detection laser detectors with an alarm level range of .02% per foot to 2.0% per foot.
 - c) The system shall also include up to nine levels of Prealarm, selected by detector, to indicate impending alarms to maintenance personnel.
 - 5) The ability to display or print system reports.
 - 6) Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification twenty (20) times.
 - 7) PAS presignal, meeting NFPA 72 requirements.
 - Rapid manual station reporting (under 3 seconds) and shall meet NFPA 72–requirements for activation of notification circuits within ten (10) seconds of initiating device activation.
 - 9) Periodic detector test, conducted automatically by the software.
 - 10) Self optimizing pre-alarm for advanced fire warning, which allows each

detector to learn its particular environment and set its prealarm level to just above normal peaks.

- 11) <u>Cross Zoning with the Capability of Counting</u>: Two (2) detectors in alarm, two (2) software zones in alarm, or one (1) smoke detector and one thermal detector.
- 12) Walk test, with a check for two (2) detectors set to same address.
- 13) Control-by-time for non-fire operations, with holiday schedules.
- 14) Day/night automatic adjustment of detector sensitivity.
- 15) Device blink control for sleeping areas.
- h. The FACP shall be capable of coding main panel node notification circuits in March Time (120 PPM), Temporal (NFPA 72), and California Code.
 - 1) Panel notification circuits (NAC 1,2,3 and 4) shall also support 2-stage operation.
 - 2) 2- stage operation shall allow 20 Pulses Per Minute (PPM) on alarm and 120 PPM after five (5) minutes or when a second device activates.
 - 3) The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific "sync pulse."
- i. <u>Network Communication</u>: The FACP shall be capable of communicating on a Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol.
- j. <u>Central Microprocessor</u>:
 - 1) The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces.
 - a) It shall include an EPROM for system program storage, Flash memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
 - 2) The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system.
 - a) Control-by-event equations shall be held in non-volatile programmable memory and shall not be lost even if system primary and secondary power failure occurs.
 - 3) The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.
 - a) The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
 - b) The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.
 - 4) A special program check function shall be provided to detect common operator errors.
 - 5) An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
 - 6) For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available.
 - a) This program shall be used to off-line program the system with batch upload/download, and have the ability to upgrade the manufacturers (FLASH) system code changes.
 - b) This program shall also have a verification utility, which scans the program files, identifying possible errors.

- (i) It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes.
- c) This shall be in compliance with the NFPA 72 requirements for testing after system modification.
- k. <u>System Display</u>:
 - 1) The system shall support the following display mode options:
 - a) The display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
 - b) The 640-character display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
 - 2) The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
 - 3) The 80-character display shall provide 12 Light-Emitting-Diodes (LEDs), that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, ALARM SILENCED, Controls Active, Pre-Discharge, Discharge and Abort.
 - 4) The 80-character display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard.
 - a) This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming.
 - b) Two different password levels shall be provided to prevent unauthorized system control or programming.
 - 5) The system shall support the display of battery charging current and voltage on the 80-character LCD display.
- I. <u>Signaling Line Circuits (SLC)</u>:
 - 1) Each FACP or FACP network node shall support up to two SLCs.
 - a) Each SLC interface shall provide power to and communicate with up to one hundred fifty-nine (159) intelligent detectors (ionization, photoelectric or thermal) and one hundred fifty-nine (159) intelligent modules (monitor or control) for a loop capacity of three hundred eighteen (318) devices.
 - b) The addition of the optional second loop shall double the device capacity, supporting a total of 636 devices.
 - c) Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
 - 2) CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector.
 - a) The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector.
 - b) The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

- m. Serial Interfaces:
 - 1) The system shall include two (2) serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Information Technology Equipment (ITE) peripherals.
 - 2) One EIA-232 interface shall be used to connect an UL-Listed 40 or 80 column printer.
 - a) Printers that are not UL-Listed are not considered acceptable substitutes.
 - 3) One EIA-232 interface shall be used to connect an UL-Listed 40 or 80 column printer.
 - a) Printers that are not UL-Listed are not considered acceptable substitutes.
 - 4) One EIA-232 interface shall be used to connect a UL-listed CRT terminal.
 - a) This interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines.
 - b) This ancillary capability shall allow remote readout of all status information, including analog values, and shall not interfere with or degrade FACP operations when used.
 - c) It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode.
 - (i) It shall also allow adjustment of detector sensitivity and readout of the history file.
 - 5) The system shall include an EIA-485 port for the serial connection of optional annunciators and remote LCD displays.
 - 6) The EIA-485 interface may be used for network connection to a proprietary-receiving unit.
- n. Enclosures:
 - 1) The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting.
 - a) The cabinet and front shall be corrosion protected, given a rustresistant prime coat, and manufacturer's standard finish.
 - 2) The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top.
 - 3) The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
 - a) For convenience, the door may be site configured for either right or left hand hinging.
- o. <u>Power Supply</u>:
 - 1) Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
 - 2) Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs.
 - a) The power supply shall provide an integral battery charger for use with batteries up to 55 AH or may be used with an external battery and charger system.
 - b) Battery arrangement may be configured in the field.
 - 3) The power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:
 - a) Ground Fault LED.
 - b) AC Power Fail LED.
 - c) NAC on LED (4).

- 4) The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
- 5) The main power supply shall provide a battery charger using dual-rate charging techniques for fast battery recharge and be capable of charging batteries up to 200 AH.
- 6) All circuits shall be power-limited, per UL864 requirements.
- p. <u>Auxiliary Field Power Supply Addressable</u>:
 - 1) The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24VDC power.
 - a) The power supply shall also include and charge backup batteries.
 - 2) The addressable power supply for the fire alarm system shall provide up a minimum of 6.0 amps of 24 volt DC regulated power for Notification Appliance Circuit (NAC) power or 5 amps of 24 volt DC general power.
 - a) The power supply shall have an additional .5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply.
 - b) It shall include an integral charger designed to charge 7.0 25.0 amp hour batteries.
 - 3) The addressable power supply shall provide four (4) individually addressable Notification Appliance Circuits that may be configured as two Class "A" and two Class "B" or four Class "B" only circuits.
 - a) All circuits shall be power-limited per UL 864 requirements.
 - 4) The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules.
 - a) The power supply's output circuits shall be individually selected for synchronization.
 - b) A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.
 - 5) The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.
 - 6) The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes.
 - a) The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire.
 - b) Data on the SLC shall be transmitted between 24 VDC, 5 VDC and 0 VDC at approximately 3.33k baud.
 - 7) The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection.
 - a) In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
 - 8) The addressable power supply shall have an AC Power Loss Delay option.
 - a) If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed.

- b) A delay time of eight (8) or sixteen (16) hours shall be Dip-switch selected.
- 9) The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be Dip-switch selectable.
- 10) The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.
- 11) Each of the power supply's four output circuits shall be DIP-switch selected for Notification Appliance Circuit or General Purpose 24 VDC power.
 - a) Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
- 12) The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor.
 - a) When the power supply's output circuit is selected as General 24VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
- 13) When selected for Notification Appliance Circuits, the output circuits shall be individually DIP-switch selectable for Steady, March Time, Dual Stage or Temporal.
- 14) When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.
- 15) The addressable power supply shall interface and synchronize with other power supplies of the same type.
 - a) The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
- 16) An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging.
 - a) Interfaced power supplies shall have the option to share backup battery power.
- q. <u>Field Charging Power Supply (FCPS)</u>: The FCPS-24S6/8 is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
 - 1) The FCPS-246 shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power.
 - a) It shall include an integral charger designed to charge up to 18 7.0 amp hour batteries and to support up to 60 hour standby.
 - b) The FCPS-24S8 shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24 volt power.
 - c) It shall include an integral charger designed to charge up to 18.0 amp hour batteries and to support up to 60 hour standby.
 - 2) The Field Charging Power Supply shall have two input triggers.
 - a) The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay.
 - b) Four (4) outputs {two (2) Style Y or Z and two (2) style Y} shall be available for connection to the Notification devices.
 - The FCPS shall include an attractive surface mount backbox.
 - 4) The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
 - 5) The FCPS include power limited circuitry, per UL standards.
- r. <u>Specific System Operations</u>:

3)

- <u>Smoke Detector Sensitivity Adjust</u>: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad.
 - a) Sensitivity range shall be within the allowed UL window and have a minimum of nine (9) levels.
- 2) <u>Alarm Verification</u>: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector.
 - a) The alarm verification delay shall be programmable from five (5) to thirty (30) seconds and each detector shall be able to be selected for verification.
 - b) The FACP shall keep a count of the number of times that each detector has entered the verification cycle.
 - (i) These counters may be displayed and reset by the proper operator commands.
- 3) <u>Point Disable</u>: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
- 4) <u>Point Read</u>: The system shall be able to display or print the following point status diagnostic functions:
 - a) Device status.
 - b) Device type.
 - c) Custom device label.
 - d) View analog detector values.
 - e) Device zone assignments.
 - f) All program parameters.
- 5) <u>System Status Reports</u>: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
- 6) <u>System History Recording and Reporting</u>: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 800 events.
 - a) Up to two hundred (200) events shall be dedicated to alarm and the remaining events are general purpose.
 - b) Systems that do not have dedicated alarm storage, where events are overridden by non-alarm type events, are not suitable substitutes.
 - c) Each of these activations will be stored and time and date stamped with the actual time of the activation.
 - d) The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety.
 - e) The history buffer shall use non-volatile memory.
 - f) Systems that use volatile memory for history storage are not acceptable substitutes.
- 7) <u>Automatic Detector Maintenance Alert</u>: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time.
 - a) If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the optional printer.
 - b) This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
- 8) <u>Pre-Alarm Function</u>: The system shall provide two (2) levels of pre-alarm

warning to give advance notice of a possible fire situation.

- a) Both pre-alarm levels shall be fully field adjustable.
- b) The first level shall give an audible indication at the panel.
- c) The second level shall give an audible indication and may also activate control relays.
- d) The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
- 9) <u>Software Zones</u>: The FACP shall provide one hundred (100) software zones, ten (10) additional special function zones, ten (10) releasing zones, and twenty (20) logic zones.
- 10) The fire alarm control panel shall include a walk test feature.
 - a) It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system.
 - b) Operation shall be as follows:
 - (i) Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for three (3) seconds.
 - c) Introducing a trouble into the initiating device shall activate the programmed outputs for eight (8) seconds.
 - d) All devices tested in walk test shall be recorded in the history buffer.
- s. <u>Waterflow Operation</u>: An alarm from a waterflow detection device shall activate the appropriate alarm message on the main panel display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
- t. <u>Supervisory Operation</u>: An alarm from a supervisory device shall cause the appropriate indication on the system display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
- u. <u>Signal Silence Operation</u>: The FACP shall have the ability to program each output circuit (notification, relay, speaker etc.) to deactivate upon depression of the signal silence switch.
- v. <u>Non-Alarm Input Operation</u>: Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices.
 - 1) Non-alarm functions are a lower priority than fire alarm initiating devices.

5. SYSTEM COMPONENTS

- a. <u>Programmable Electronic Sounders</u>:
 - 1) Electronic sounders shall operate on 24 VDC nominal.
 - 2) Electronic sounders shall be field programmable without the use of special tools, at a sound level of at least 90 dBA measured at 10' from the device.
 - 3) Shall be flush or surface mounted as shown on plans.
- b. <u>Strobe Lights</u>: Shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, and shall meet the following criteria:
 - 1) The maximum pulse duration shall be 2/10 of one second.
 - 2) Strobe intensity shall meet the requirements of UL 1971.

- 3) The flash rate shall meet the requirements of UL 1971.
- 4) Strobes within one space or within one apartment shall be synchronized.
- c. <u>Manual Fire Alarm Stations</u>:
 - 1) Manual fire alarm stations shall be non-code, non-break glass type, equipped with key lock so that they may be tested without operating the handle.
 - 2) Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.
 - 3) An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100' front or side.
 - 4) Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover.
 - a) The word FIRE shall appear on the manual station in letters 1/2" in size or larger.
- d. <u>Automatic Conventional Heat Detectors</u>:
 - Automatic heat detectors shall have a combination rate of rise and fixed temperature rated at 135°F for areas where ambient temperatures do not exceed 100°F, and 200°F for areas where the temperature does not exceed 150°F.
 - 2) Automatic heat detectors shall be a low profile, ceiling mount type with positive indication of activation.
 - 3) The rate of rise element shall consist of an air chamber, a flexible metal diaphragm, and a factory calibrated, moisture-proof, trouble free vent, and shall operate when the rate of temperature rise exceeds 15°F per minute.
 - 4) The fixed temperature element shall consist of a fusible alloy retainer and actuator shaft.
 - 5) Automatic heat detectors shall have a smooth ceiling rating of 2,500 s.f.
- e. <u>Waterflow Indicator</u>:
 - 1) Waterflow Switches shall be an integral, mechanical, non-coded, nonaccumulative retard type.
 - Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from zero (0) to sixty (60) seconds. Initial settings shall be 30-45 seconds.
 - 3) All waterflow switches shall come from a single manufacturer and series.
 - 4) Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
 - 5) Where possible, locate waterflow switches a minimum of 1' from a fitting which changes the direction of the flow and a minimum of 3' from a valve.
- f. <u>Sprinkler and Standpipe Valve Supervisory Switches</u>:
 - 1) Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch.
 - a) Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
 - 2) PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.

- 3) The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
- 4) The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4" conduit entrance and incorporate the necessary facilities for attachment to the valves.
- 5) The switch housing shall be finished in red baked enamel.
- 6) The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
- 7) Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
 - a) This unit shall provide for each zone: alarm indications, using a red alarm a yellow trouble long-life LEDs and control switches for the control of fire alarm control panel functions.
 - b) The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.
 - c) Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.
- g. <u>Alphanumeric LCD Type Annunciator</u>:
 - 1) The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
 - 2) The LCD annunciator shall display all alarm and trouble conditions in the system.
 - 3) An audible indication of alarm shall be integral to the alphanumeric display.
 - 4) The display shall be UL listed for fire alarm application.
 - 5) It shall be possible to connect up to thirty-two (32) LCD displays and be capable of wiring distances up to 6,000' from the control panel.
 - 6) The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface.
 - a) This is a two-wire loop connection and shall be capable of distances to 6,000'.
 - b) Each terminal mode LCD display shall mimic the main control panel.
 - 7) The system shall allow a minimum of thirty-two (32) terminal mode LCD annunciators and shall be capable of the following system functions:
 - a) Acknowledge
 - b) Signal Silence
 - c) Reset
 - (i) Which shall be protected from unauthorized use by a key switch or password.
 - 8) The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.
- h. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.
- i. <u>Universal Digital Alarm Communicator Transmitter (UDACT)</u>: The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL-Listed central station.
 - The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet.
 - a) Optionally, the UDACT shall have the ability for remote mounting, up to 6,000' from the fire alarm control panel.
 - b) The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status.
 - c) Systems that utilize relay contact closures are not acceptable.
 - 2) The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements.
 - a) It shall include the ability for split reporting of panel events up to three (3) different telephone numbers.
 - 3) The UDACT shall be completely field programmable from a built-in keypad and four (4) character red, seven segment display.
 - 4) The UDACT shall be capable of transmitting events in at least fifteen (15) different formats.
 - a) This ensures compatibility with existing and future transmission formats.
 - 5) Communication shall include vital system status such as:
 - a) Independent Zone (Alarm, trouble, non-alarm, supervisory)
 - b) Independent Addressable Device Status
 - c) AC (Mains) Power Loss
 - d) Low Battery and Earth Fault
 - e) System Off Normal
 - f) 12 and 24 Hour Test Signal
 - g) Abnormal Test Signal (per UL requirements)
 - h) EIA-485 Communications Failure
 - i) Phone Line Failure
 - 6) The UDACT shall support independent zone/point reporting when used in the Contact ID format.
 - a) In this format the UDACT shall support transmission of up to 2,040 points.
 - b) This enables the central station to have exact details concerning the origin of the fire or response emergency.
 - 7) AN IP Communicator option shall be available to interface to the UDACT and be capable of transmitting signals over the internet/intranet to a compatible receiver.
- j. <u>Field Wiring Terminal Blocks</u>: For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire.
 - 1) Terminal blocks that are permanently fixed are not acceptable.

6. SYSTEM COMPONENTS/ADDRESSABLE DEVICES

- a. <u>Addressable Devices General</u>:
 - 1) Addressable devices shall use simple to install and maintain decade, decimal address switches.
 - a) Devices shall be capable of being set to an address in a range of 001 to 159.

- 2) Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute.
 - a) Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.
- 3) Detectors shall be intelligent (analog) and addressable and shall connect with two (2) wires to the fire alarm control panel Signaling Line Circuits.
- 4) Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs.
 - a) Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected.
 - b) If required, the LED flash shall have the ability to be removed from the system program.
 - c) An output connection shall also be provided in the base to connect an external remote alarm LED.
- 5) The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system.
 - a) The panel on a time-of-day basis shall automatically adjust sensitivity.
- 6) Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
 - a) The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72.
- 7) The detectors shall be ceiling-mount and shall include a separate twistlock base with tamper proof feature.
 - a) Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.
- 8) The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
 - a) Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
- 9) Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
- 10) Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values.
 - a) The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
- 11) Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
- 12) A magnetic test switch shall be provided to test detectors and modules.
 - a) Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

- 13) Addressable modules shall mount in a 4" square, 2-1/8" deep electrical box.
 - a) An optional surface mount Lexan enclosure shall be available.
- b. Addressable Manual Fire Alarm Box (Manual Station):

1)

- Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status.
 - a) They shall use a key operated test-reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
- 2) All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
- 3) Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover.
 - a) The word FIRE shall appear on the front of the stations in raised letters, 1.75" or larger.
- c. <u>Intelligent Photoelectric Smoke Detector</u>: The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
- d. <u>Intelligent Ionization Smoke Detector</u>: The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.
- e. <u>Intelligent Thermal Detectors</u>: Thermal detectors shall be intelligent addressable devices rated at 135°F and have a rate-of-rise element rated at 15°F per minute. It shall connect via two (2) wires to the fire alarm control panel signaling line circuit.
- f. Addressable Dry Contact Monitor Module:
 - Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
 - 2) The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
 - 3) For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4" x 1-1/4" x 1/2". This version need not include Style D or an LED.
 - 4) For multiple dry contact monitoring a module shall be available that provides 10 Style B or 5 Style D input circuits.
- g. <u>Two Wire Detector Monitor Module</u>:
 - 1) Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 - 2) The IDC zone may be wired for Class A or B (Style D or Style B) operation.

- a) An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
- 3) For multiple 2-wire smoke detector circuit monitoring a module shall be available that provides 6 Style B or 3 Style D input circuits.
- h. <u>Addressable Control Module</u>:
 - 1) Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances.
 - 2) The control module NAC may be wired for Style Z or Style Y (Class A/B) with a current rating of 2 Amps for Style Z and 3 Amps for Style Y. For speaker applications the module is rated for 50 watts at 25 or 70.7 Vrms.
 - 3) Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised UL listed remote power supply.
 - 4) For multiple circuit control a module shall be available that provides 6 Style B or 3 Style D control circuits.
- i. <u>Addressable Relay Module</u>:
 - 1) Addressable Relay Modules shall be available for HVAC control and other building functions.
 - a) The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.
 - b) The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary devices energize at the same time on the same pair of wires.
 - 2) For multiple relay control a module shall be available that provides 6 programmable Form-C relays.
- j. <u>Addressable Releasing Control Module</u>:
 - 1) An addressable FlashScan releasing module shall be available to supervise and control compatible releasing agent solenoids.
 - 2) The module shall operate on a redundant protocol for added protection.
 - 3) The module shall be configurable for Style Z or Style Y (Class A/B) and support one 24 volt or two 12- volt solenoids.

7. BATTERIES

- a. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus five (5) minutes of alarm upon a normal AC power failure.
- b. The batteries are to be completely maintenance free.
 - 1) No liquids are required.
 - 2) Fluid level checks for refilling, spills, and leakage shall not be required.
- c. If necessary to meet standby requirements, external battery and charger systems may be used.

C. EXECUTION

1. INSTALLATION

- a. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- b. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.
 - 1) Smoke detectors shall not be installed prior to the system programming and test period.
 - 2) If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
- c. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- d. Manual fire alarm boxes shall be semi-flush mounted as shown on the plans, and shall be installed not less than 42", nor more than 48" above the finished floor.

2. TESTING

- a. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.
- b. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- c. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
- d. Verify activation of all waterflow switches.
- e. Open initiating device circuits and verify that the trouble signal actuates.
- f. Open and short signaling line circuits and verify that the trouble signal actuates.
- g. Open and short notification appliance circuits and verify that trouble signal actuates.
- h. Ground all circuits and verify response of trouble signals.
- i. Check presence and audibility of tone at all alarm notification devices.
- j. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
- k. Each of the alarm conditions that the system is required to detect should be introduced on the system.
 - 1) Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

- I. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures.
 - 1) This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3. FINAL INSPECTION

a. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

4. INSTRUCTION

- a. Instruction shall be provided as required for operating the system.
 - 1) Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
- b. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

28 46 11 - SMOKE DETECTION

A. GENERAL

- 1. SCOPE
 - a. This section covers furnishing and installing approved single station, UL 217listed smoke detectors powered by 120, VAC, 60HZ power source as noted on the drawings, as herein specified and/or as required for a complete job.

B. MATERIALS

- 1. COMBINATION SMOKE DETECTOR/CO DETECTORS
 - a. Shall be BRK Electronics Model SC7010B. Install in dwelling units.
- 2. SMOKE DETECTORS
 - a. Shall be BRK Electronics Model 7010B. Install in dwelling unit bedrooms as shown on plans.

3. SENSORY IMPAIRED UNITS

- a. At all sensory-impaired units, provide BRK Electronics Model SL177 strobe in each bedroom, living room and bathroom.
 - 1) Interconnect all visual devices within unit with smoke detectors within the dwelling.

4. RELAYS

- a. (For interconnection to additional devices) BRK RM4.
 - 1) Install in metal junction box.

C. OPERATION

- a. The detectors within the dwelling units shall be interconnected for simultaneous operation.
 - 1) Provide new batteries for each device.

<u>31 00 00 - EARTHWORK</u>

A. GENERAL

Drawings and general provisions of the contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to work of this section.

- 1. RELATED WORK
 - a. Section 02 30 00 SOILS INVESTIGATION
 - b. Section 02 00 00 SITE PREPARATION
 - c. Section 31 25 00 EROSION AND SEDIMENT CONTROL
 - d. Section <u>33 41 00 STORM UTILITY DRAINAGE</u>
 - e. Section <u>32 12 16 ASPHALT PAVING</u>
 - f. Section <u>32 13 13 CONCRETE PAVING</u>
- 2. DESCRIPTION OF WORK
 - a. Extent of earthwork is indicated on drawings and specified herein. The Contractor shall be responsible for familiarizing himself with the existing site conditions. Earthwork includes the following:
 - 1) Excavation and preparation of subgrade for building foundations & footings, building slabs, curbs, walks, pavements, and site improvements is included as part of this work.
 - 2) Special excavation, backfill and compaction of specific areas of the site is included as part of this work.
 - 3) Dewatering to keep subgrades and excavations dry is included as part of this work.
 - 4) Floor Slab course for support of building slabs is included as part of this work.
 - 5) Subbase course for support of pavements and walks is included as part of this work.
 - 6) Grading, compaction and preparation of subgrade for building foundations, slabs, walks and pavements is included as part of this work.
 - 7) Excavation and grading of underground storm water retention areas is included as part of this work.
 - 8) Placement of topsoil and finish grading of lawn areas included as part of this work.
 - b. <u>Excavation for Mechanical and Electrical Work</u>: Excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances is to be included with Divisions <u>23</u> <u>HVAC AIR DISTRIBUTION</u> and <u>26 ELECTRICAL</u> respectively, as indicated.
 - c. <u>Definition:</u> "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.
- 3. QUALITY ASSURANCE

- a. <u>Codes and Standards</u>: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- b. Owner will retain testing laboratory to perform soil testing and inspection service for quality control testing during earthwork operations.
- c. Contractor shall test the soil compaction prior to the placement of the following. Contractor to notify Architect when work is ready for testing.
 - 1) Contractor responsible for any re-testing, including costs of such tests, for rejected work or failed tests.
 - a) Footings
 - b) Slabs
 - c) Pavements
 - d) Walls
 - e) Each layer of fill
 - f) Off-site or on-site borrow soil materials

4. JOB CONDITIONS

- a. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings.
- b. It is expressly understood that Owner and/or Architect will not be responsible for interpretations or conclusions drawn there from by Contractor.
- c. Data are made available for convenience of Contractor.
- d. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.
- e. <u>Existing Utilities</u>:
 - 1) Locate existing underground utilities in areas of work.
 - 2) If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
 - 3) Should uncharted, or incorrectly charted, piping, or other utilities be encountered during excavation, consult Utility Owner and Architect immediately for directions.
 - 4) Cooperate with Owner and utility companies in keeping respective services and facilities in operation.
 - 5) Repair damaged utilities to satisfaction of utility owner.
 - 6) Do not interrupt existing utilities serving on-site or off-site facilities, except when permitted in writing by the Utility Owner and then only after acceptable temporary utility services have been provided.
- f. The use of explosives is not permitted.
- g. <u>Protection of Persons and Property</u>:
 - 1) Barricade open excavations occurring as part of this work and post with warning lights and signage.
 - a) Operate warning lights as recommended by authorities having jurisdiction.
 - 2) Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

B. PRODUCTS

1. SOIL MATERIALS

- a. "Satisfactory soil materials" are defined as those complying with ASTM D2487 soil classification groups GP, SW and SP. (Sand and gravel soil types).
- b. "Restricted soil materials" are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT. (Silts, clays and organic soil types).
- c. <u>Subbase Material</u>: INDOT #53 graded mixture of natural gravel, natural stone, crushed gravel, crushed stone or recycled concrete.
- d. <u>Structural Fill</u>: Defined as any fill which will support structural loads, should be free of organic material, have a plasticity index of less than 25%, a maximum particle size of no more than 3" and a maximum dry density in excess of 100 pounds per cubic foot (pcf), as determined by the standard Proctor compaction test (ASTM D698).
 - 1) In addition, structural fill should not be frost susceptible.
 - 2) Submit sample to Geotechnical Engineer for review and approval.
- e. <u>Floor Slab Course</u>: Clean, free-draining granular material, relatively clean, freedraining granular soil should contain no more than 5% fines, by dry weight, passing a No. 200 U.S. Standard sieve and have an effective size (D10) greater than 0.25 mm.
 - 1) Submit sample to Geotechnical Engineer for review and approval.
- f. <u>Topsoil</u>: Contractor shall clean existing topsoil for reuse to remove subsoil, clay lumps, brush, grasses, weeds, debris and other litter, and free of roots, stumps, stones larger than 1" in any dimension, and other extraneous or toxic substance harmful to plant growth.

C. EXECUTION

- 1. GENERAL
 - a. Do all removals, excavation, filling, backfilling, rough grading, and final grading required to provide for and install contract work required, as noted on the drawings, and as specified herein.
 - b. Coordinate excavation operations for the project phases and proper sequence of operations with applicable trades.
 - c. Extreme caution shall be exercised when excavating adjacent to the existing buildings and public streets so that the existing footings or slabs are not undermined.
- 2. GROUND SURFACE PREPARATION
 - a. Remove existing vegetation, debris, "restricted" soil materials, obstructions, and deleterious materials from building pad and paving areas and from a ten (10) foot perimeter around said areas. Refer to Section <u>02 30 00 SOILS</u> <u>INVESTIGATION.</u>

- b. After clearing, stripping and excavating the building, pavement and special excavation areas to design subgrades, but prior to filling, the subgrade be proofrolled in the presence of the Geotechnical Engineer.
 - 1) Proofroll with a fully-loaded tandem-axle truck (50,000 lbs. min.) or other suitable pneumatic-tire construction equipment.
 - 2) The purpose of the proofroll is to locate areas of unsuitably loose or disturbed subgrade.
 - 3) Areas of unsuitable subgrade revealed during proofrolling should be mechanically improved (compacted) in place, if feasible.
 - 4) Unsuitable subgrade that cannot be improved in-place must be removed and replaced with structural fill.
 - 5) Unstable areas revealed during proofrolling may also indicate the presence of voids or underlying organics, which would require removal and replacement.
 - 6) Unsuitable and/or unstable areas identified during proofrolling shall be evaluated by Geotechnical Engineer.
 - 7) After proofrolling and after any necessary subgrade improvements are completed, engineered fill may then be placed on the prepared subgrade to establish design subgrade elevations.
 - 8) Unsuitable soil areas that are encountered beyond subgrade excavation limits, will be reviewed by Geotechnical Engineer.
 - a) Any required correction of these unsuitable areas will be additional services per Unit Prices and/or negotiated lump sum.
 - 9) Surface water shall be retained on-site.
 - a) At no time allow water or soils to spill onto adjacent properties.

3. EXCAVATION

- a. Perform excavation of every description and of whatever substances are encountered to the lines and depths indicated on the plans.
- b. <u>Site Excavation</u>: Excavate within grading limits to the lines and elevations indicated on the drawings.
- c. <u>Earth Excavation</u>: Excavation of pavements and other obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as unauthorized excavation.
- d. <u>Special Excavation</u>: Excavation within specific locations within the proposed building. Refer to Site Grading Plan for location and limits of special excavation areas.
- e. <u>Site Improvements</u>:
 - 1) Excavate for exterior concrete slabs, curbs, sidewalks and areas etc. to the required subgrade depths.
 - 2) All exterior concrete pavements, slabs and sidewalks are to be placed on not less than 4" of compacted subbase material fill.
- f. <u>Structure Excavation</u>: Excavate for foundations and footings to the subgrade depth indicated on the drawings.
 - 1) Unsuitable and/or unstable areas identified during excavation shall be evaluated by Geotechnical Engineer.

- 2) Once the foundation subgrade level is reached, the exposed sandy subgrade soils should first be compacted and then tested to determine that a minimum density equivalent to 98% of the standard.
- 3) Proctor density (ASTM D698) exists to a depth of 2' below the foundation subgrade.
- 4) For densification of the foundation subgrades, we recommend the bottom of the footing excavation be compacted with high-energy jumping jack type compactor to achieve the specified minimum field density.
- 5) Where structural fill is required under foundations, it should extend laterally beyond all edges of the footings at least 6" for every 12" of undercut or fill depth required below the base of the foundation.
- 6) The trenches for column footings, foundations, areas, pits, etc. are to be dug and formed, level, square and to full dimensions and depths indicated on plans.
 - a) Excavate to a point not less than 1'-6" outside of each side of the footing lines to permit erection of forms.
 - b) Where structural fill is installed under footings or foundations, it should extend laterally beyond all edges of the footings and foundations at least 6" for every 12" of undercut or fill depth required below the base of the foundation.
- 6) Blade grade all floor, walk, and pavement areas to $\pm 1/2$ " of finish subgrade.
- 7) <u>Shoring and Bracing</u>: All excavations shall be properly shored as required to prevent cave-in.
 - a) Excavation walls should be sloped, shielded or shored in accordance with current Occupational Safety and Health Administration (OSHA) guidelines and requirements.
- 8) The space between the walls and banks shall be kept free from earth and rubbish while building same.
- g. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation shall be at Contractor's expense.
 - 1) Under footings and foundation bases, fill unauthorized excavation with "Structural fill" material by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
 - a) Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Architect.
 - 2) Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Architect.

4. DEWATERING

- a. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- b. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1) Reroute surface water runoff away from excavated areas.
 - 2) Do not allow water to accumulate in excavations.
 - 3) Do not use excavated trenches as temporary drainage ditches.

c. Provide temporary drainage measures during construction for site and buildings until permanent drainage structures are in installed and operable.

5. MATERIAL STORAGE

- a. Stockpile satisfactory and suitable excavated materials on-site or as where directed, until required for backfill or fill.
 - 1) Place, grade, and shape stockpiles for proper drainage.
 - 2) Locate and retain soil materials away from edge of excavations.
 - 3) Do not store within drip line of trees indicated to remain.

6. COMPACTION

- a. Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.
- b. Compact soils to not less than the following percentages of maximum Standard Proctor density:
 - Exposed subgrade soils for footings and foundations to be tested to determine that a minimum density equivalent to 98% to a depth of 2'-0" below foundation subgrade elevation.
 - 2) Compact soils with mechanical equipment to achieved specified minimum density if necessary.
 - 3) Under structures and building slabs, scarify and recompact top 12" of existing subgrade at 95%.
 - 4) Structural fill be compacted to at least 98%. Where placed below footings, extend beyond edge of footing a minimum of 6" for each 12" of structural fill depth.
 - 5) <u>Pavements</u>:
 - a) Structural fill be compacted to at least 95% to within 2' of the pavement subgrade or bottom of the aggregate subbase course.
 - a) The aggregate subbase material shall also be compacted to 98%.
 - 6) <u>Below-Grade Walls</u>: Compact top 12" of subgrade and each layer of backfill or fill material at 95%.
 - 7) <u>Walkways</u>: Compact top 12" of subgrade and each layer of backfill or fill at 95%.
 - 8) <u>Lawn or Unpaved Areas</u>: Compact top 6" of subgrade and each layer of backfill or fill at 90%.

7. MOISTURE CONTROL

- a. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material.
- b. Apply water in manner to prevent free water appearing on surface during or subsequent to compaction operations.
 - 1) Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 2) Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry.
 - 3) Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

8. BACKFILL AND FILL

- a. Place acceptable soil material in layers to required elevations, as listed below.
 - 1) In excavations, use "satisfactory" excavated or borrow material.
 - 2) Under grassed areas, use "satisfactory" excavated or borrow material.
 - 3) Under footings, foundations, building slabs, walks and pavements, use "structural fill" to subgrade levels.
 - 4) Under floor slabs, use "floor slab course" material above subgrade levels.
 - 5) Under exterior slabs, walks and pavements, use "subbase" material above subgrade levels.
 - 6) Under piping and conduit, use "satisfactory" material where granular material is indicated under piping or conduit; shape to fit bottom 90° of cylinder and backfill with "satisfactory" material to the elevation shown on the plans.
- b. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1) Acceptance of construction below finish grade including, where applicable.
 - 2) Inspections, testing, approval and recording locations of underground utilities.
 - 3) Removal of concrete formwork.
 - 4) Removal of trash, rubbish, and debris.
- c. Notify Architect for inspection/approval of structure prior to backfill.

9. PLACEMENT AND COMPACTION

- a. Place fill materials in layers not more than 9" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.
 - 1) Each layer shall be sprinkled with water as required to secure specified compactions.
- b. Any fill placed within the construction area, including utility trench backfill, must be an approved material, free of frozen soil, organics, or other deleterious materials.
 - The fill must be placed on suitably prepared subgrade, spread in level layers not exceeding 9" in loose thickness and compacted to a minimum of 95% of the maximum density determined in accordance with the Standard Proctor test.
 - 2) Granular fill be compacted using a vibratory drum roller or vibratory plate type compactors.
 - Thinner lifts will be necessary to achieve compaction throughout the full lift thickness, when using small, walk-behind type compaction equipment.
- c. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content.
 - 1) Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
 - 2) Do not place fill material on surfaces that are muddy, frozen, or contain frost or ice.

10. ROUGH GRADING

- a. Place "satisfactory soil materials", at locations required to bring soil to new established elevations outside pavement areas, building lines and over site, as indicated on the drawings.
- b. Work grades to provide for surface drainage as indicated on the drawings.
- c. Uniformly grade areas within limits of grading under this section, including adjacent transition areas.
- d. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- e. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- f. Finish surfaces free from irregular surface changes, and as follows:
 - 1) <u>Lawn or Unpaved Areas</u>: Finish areas to receive topsoil to within not more than 1" above or below required subgrade elevations.
 - 2) <u>Walks</u>: Shape surface of areas under walks to line, grade and crosssection, with finish surface not more than ½" above or below required subgrade elevation.
 - 3) <u>Pavements</u>: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than ½" above or below required subgrade elevation.
 - 4) <u>Building Slabs</u>: Grade smooth and even, free of voids, compacted as specified, and to required elevation.
 - a) Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.
 - 5) <u>Compaction</u>: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum density for each area classification.
 - a) Bring to levels any areas where settlement occurs before completion of the work.

11. FINISH GRADING

- Clean subgrade of all debris, trash, roots, branches and stones larger than 2".
 Compacted areas to be disc and broken up to loosen subgrade to ensure good bond between subgrade and topsoil.
- b. Furnish and place clean topsoil, free of all trash, debris, stones, roots, etc. to a minimum depth of 3" and a maximum of 4" in all lawn and planting areas, unless otherwise noted.
 - 1) <u>Spread no topsoil until subgade has been reviewed and approved by</u> <u>Architect</u>.
 - 2) Remove debris and fine grade smooth.
- c. Spread and level topsoil to elevations required.
 - Bring to required level any areas where settlement or erosion of the topsoil occurs before acceptance of work.
- 12. FLOOR SLAB COURSE

1)

- a. Course consists of placement of "floor slab course" material over approved subgrade surface to support concrete building slabs.
- b. Place course material on prepared subgrade in a single layer of uniform thickness, conforming to indicated cross-section and thickness.
 - 1) Maintain optimum moisture content for compacting material during placement operations.
- c. Prior to concrete placement for floor slabs, the building pad subgrade should again be observed and tested to identify any areas of subgrade that were disturbed during construction activities and to verify subgrade conditions are suitable for floor slab support.
 - 1) Unsuitable subgrade, or contaminated aggregate material, indicated by Geotechnical Engineer should be recompacted or removed and replaced with structural fill.
- d. The slab-on-grade subgrade soils shall be protected from frost during winter construction.
 - 1) Any frozen soils shall be thawed and compacted or removed and replaced prior to slab-on-grade construction.

13. PAVEMENT SUBBASE COURSE

- a. Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
 - 1) During construction, maintain lines and grades including crown and cross-slope of subbase course.
- b. <u>Placing</u>:
 - 1) Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross- section and thickness.
 - 2) Place material in equal layers, except no single layer more than 6" thick or less than 3" in thickness when compacted.
 - 3) Maintain optimum moisture content for compacting subbase material during placement operations.

14. FIELD QUALITY CONTROL

- a. Owner shall retain qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- b. <u>Quality Control Testing During Construction</u>: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
- c. Testing agency will test compaction of soils in place according to ASTM D 2922, as applicable. Tests will be performed at the following locations and frequencies:
 - 1) <u>Paved Areas and Building Slab Subgrade</u>:
 - a) Make at least one (1) field density test of subgrade for every 2,500 sq. ft. of paved area or building area, but in no case less than three (3) tests.
 - In each compacted fill layer, make one (1) field density test for every 2,500 sq. ft. of overlaying paved area or building slab, but in no case less than three (3) tests.

- <u>Footing Subgrade</u>: For each strata of soil on which footings will be placed, conduct at least one (1) test per 100 l.f. of footing to verify required design bearing capacities.
 - a) Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Soils Engineer.
- 3) <u>Foundation Wall Backfill</u>: Take at least two (2) field density tests per 100 I.f. of foundation wall, at locations and elevations as directed.
- d. If in opinion of Architect, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, the Contractor provide additional compaction and testing at no additional expense to the Owner.

15. MAINTENANCE

- a. Protect newly graded areas from traffic and erosion.
- b. Keep free of trash and debris.
- c. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- d. <u>Reconditioning Compacted Areas:</u> Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- e. <u>Settling:</u> Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment.
 - 1) Restore appearance, quality, and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.

16. DISPOSAL OF EXCESS AND WASTE MATERIALS

a. Remove waste materials, including excess soils, excess topsoil that cannot be spread to levels indicated, unacceptable excavated material, trash, and debris, and dispose off-site in a legal manner.

31 25 00 - EROSION AND SEDIMENT CONTROL

A. SCOPE

- 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to work of this Section.
- 2. DESCRIPTION OF WORK
 - a. Furnish all labor, materials and equipment for the proper installation and maintenance of the Erosion and Sediment Control Plan as indicated and specified.
- 3. GENERAL
 - a. <u>Owner's Responsibilities:</u>
 - 1) The Owner will be the designated "Operator" for the Erosion and Sediment Control Plan for this project.
 - 2) The "Operator" will submit the following:
 - a) "Notice of Intent" (NOI) letter, with necessary attachments, to Indiana Department of Environmental Management.
 - b) Legal notice to South Bend Tribune to notify the public that a construction activity under Rule 5 is to commence.
 - c) Copies of the Erosion and Sediment Control Plan to required agencies.
 - b. <u>Contractor's Responsibilities</u>:
 - 1) <u>Installation</u>: Provide, install and maintain required erosion and sediment control measures as indicated and specified, including any temporary or additional control measures that may be needed during the phases of construction.
 - <u>Inspections</u>: As required by local authorities during the course of construction shall be arranged. Contractor responsible to inspect project site and submit documentation to MS4 Conservationist.
 - a) Inspect after each 1/2" rain event
 - b) Inspect once every two weeks during construction activities
 - c) Inspect once every month during periods of Non-Activity
 - 3) <u>Documentation</u>: Contractor shall maintain copies of erosion control plans and specifications, permits, inspections reports and maintenance forms on-site for review by Architect, Owner and MS-4 Conservtionist.
 - 4) <u>Coordination</u>: Coordinate and cooperate with other sub-contractors to enable the work to proceed as rapidly and efficiently as possible.
 - 5) <u>Guarantee</u>: All work shall be installed and maintained as per the requirements of Rule 5-327-IAC 15-5, State of Indiana.
 - a) Guarantee shall also cover fines, penalities and repair of damage to any on and off-site improvements resulting from improper installation or installation, or other defects in material, equipment, and workmanship to the satisfaction of the Inspector.

SECTION 31 31 16 - TERMITE CONTROL

A. GENERAL

1. RELATED DOCUMENTS

a. <u>Drawings and general provisions</u> of the Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to this Section.

2. SUMMARY

a. <u>Work included</u> soil poisoning of prepared subgrade below all floor slabs and along all foundation walls.

3. SUBMITTALS

- a. <u>Product Data</u>: Treatments and application instructions, including EPA-Registered Label.
- b. <u>Soil Treatment Application Report</u>: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
 - 1) Date and time of application.
 - 2) Brand name and manufacturer of termiticide.
 - 3) Quantity of undiluted termiticide used.
 - 4) Dilutions, methods, volumes, and rates of application used.
 - 5) Areas of application.
- c. <u>Guarantee:</u> Furnish *written guarantee*, for a period of not less than five (5) years against termite and pest infestation.

4. QUALITY ASSURANCE

- a. <u>Applicator Qualifications</u>: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.
- b. <u>Regulatory Requirements</u>: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

5. COORDINATION

- a. Coordinate soil treatment application with excavating, filling, and grading and concreting operations.
- b. Treat soil under footings, grade beams, and ground-supported slabs, before construction.
- 6. WARRANTY

- a. Warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- b. <u>Special Warranty</u>: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites.
 - 1) If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
- c. <u>Warranty Period</u>: Five (5) years from date of Substantial Completion.

B. PRODUCTS

- 1. SOIL TREATMENT
 - a. Termite and Pest Protection: Provide *"Prevail FT"* (FMC Corp.) or *"Dursban TC"* (Dow Elanco) or equal approved by EPA and local Health Department.

C. EXECUTION

- 1. EXAMINATION
 - a. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
 - b. Proceed with application only after unsatisfactory conditions have been corrected.
- 2. PREPARATION
 - a. <u>General</u>: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate.
 - b. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.
 - c. <u>Soil Treatment Preparation</u>: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.
 - 1) Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings.
 - 2) Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

3. APPLICATION

a. <u>General</u>: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

- b. <u>Application</u>:
 - Apply over entire surface below floor slab at rate of 1 ½ gallons per 10 sq. ft., along exterior side of foundation walls and under building stoops.
 - 2) Apply per Manufacturer's recommendations.
 - 3) Provide installer's standard guarantee.
 - 4) Avoid disturbance of treated soil after application.
 - 5) Keep off treated areas until completely dry.
 - 6) Post warning signs in areas of application.
- c. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

32 12 16 HOT MIXED ASPHALT PAVING

- A. SCOPE
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to this Section.

2. SUMMARY

- a. This Section includes the following:
 - 1) Hot-mix asphalt paving.
 - 2) Pavement marking paint.
- b. Related Sections include the following:
 - 1) Section <u>31 00 00 EARTHWORK</u> for aggregate subbase and base courses.

3. DEFINITIONS

- a. <u>Hot-Mix Asphalt Paving Terminology</u>: Refer to ASTM D 8 for definitions of terms.
- b. <u>INDOT</u>: Indiana Department of Transportation.
- 4. SYSTEM DESCRIPTION
 - a. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local INDOT.
 - b. <u>Standard Specification</u>: INDOT
 - c. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- 5. SUBMITTALS
 - a. <u>Product Data</u>: For each type of product indicated, include technical data and tested physical and performance properties.
 - b. <u>Job-Mix Designs</u>: For each job mix proposed for the Work.
 - c. <u>Material Certificates</u>: For each paving material, signed by manufacturers.
- 6. QUALITY ASSURANCE
 - a. <u>Manufacturer Qualifications</u>: Manufacturer shall be a paving-mix manufacturer registered with InDOT of the state in which Project is located.
 - b. <u>Regulatory Requirements</u>: Comply with Standard Specifications of Indiana Department of Transportation for asphalt paving work.

- c. <u>Preinstallation Conference:</u> Conduct conference at Project site to comply with requirements in Section <u>01 31 13 PROJECT COORDINATION</u>.
 - 1) Review condition of subgrade and preparatory work.
 - 2) Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - 3) Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

7. DELIVERY, STORAGE AND HANDLING

- a. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- b. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer.
 - 1) Protect stored materials from direct sunlight.

8. PROJECT CONDITIONS

- a. <u>Environmental Limitations</u>: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
- b. <u>Tack Coats</u>: Minimum surface temperature of 60°F.
- c. <u>Asphalt Binder Course:</u> Minimum surface temperature of 40°F and rising at time of placement.
- d. <u>Asphalt Surface Course:</u> Minimum surface temperature of 60°F at time of placement.
- e. <u>Pavement Marking Paint</u>: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50°F for waterbased materials, and not exceeding 95°F.

B. PRODUCTS

- 1. AGGREGATES
 - a. <u>General</u>: Use materials and gradations that have performed satisfactorily in previous installations.
 - b. <u>Coarse Aggregate</u>: ASTM D 692, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.
 - c. <u>Fine Aggregate</u>: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.
 - 1) For hot-mix asphalt, limit natural sand to a maximum of 20% by weight of the total aggregate mass.
 - d. <u>Mineral Filler</u>: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2. ASPHALT MATERIALS

- a. <u>Asphalt Binder</u>: AASHTO MP 1, PG 64-22.
- b. Asphalt Cement: ASTM D 3381 for viscosity-graded material.
- c. <u>Tack Coat</u>: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, diluted in
- d. <u>Water</u>: Potable.
- 3. AUXILIARY MATERIALS
 - a. Sand: ASTM D 1073, Grade Nos. 2 or 3.
 - b. <u>Joint Sealant</u>: ASTM D 3405, hot-applied, single-component, polymer-modified bituminous sealant.
 - c. <u>Pavement Marking Paint:</u> Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than ten (10) minutes.
 - 1) <u>Color</u>: White
- 4. MIXES
 - a. <u>Hot-Mix Asphalt</u>: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 - 1) <u>Base Course</u>: #8 or #9 H.A.C. Binder
 - 2) <u>Surface Course</u>: #11 H.A.C. Surface

C. EXECUTION

- 1. EXAMINATION
 - a. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
 - b. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
 - c. Proceed with paving only after unsatisfactory conditions have been corrected.
- 2. SURFACE PREPARATION
 - a. <u>General</u>:
 - 1) Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
 - 2) Ensure that prepared subgrade is ready to receive paving.
 - 3) Sweep loose granular particles from surface of unbound-aggregate base course.
 - 4) Do not dislodge or disturb aggregate embedded in compacted surface of base course.

- b. <u>Tack Coat</u>: Apply uniformly to surfaces of binder asphalt course prior to placement of surface asphalt course at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1) Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2) Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings.
 - 3) Remove spillages and clean affected surfaces.

3. HOT MIXED ASPHALT PLACING

- a. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off.
- b. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix.
- c. Place each course to required grade, cross section, and thickness when compacted.
 - 1) Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2) Spread mix at minimum temperature of 250°F.
 - 3) Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 4) Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- d. Place paving in consecutive strips not less than 10' wide unless infill edge strips of a lesser width are required.
 - 1) After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
 - 2) Complete a section of asphalt base course before placing asphalt surface course.
- e. Promptly correct surface irregularities in paving course behind paver.
 - 1) Use suitable hand tools to remove excess material forming high spots.
 - 2) Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- 4. JOINTS
 - a. Construct joints to ensure a continuous bond between adjoining paving sections.
 - b. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1 Clean contact surfaces and apply tack coat to joints.
 - 2) Offset longitudinal joints, in successive courses, a minimum of 6".
 - 3) Offset transverse joints, in successive courses, a minimum of 24".
 - 4) Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5) Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6) Compact asphalt at joints to density within 2% of specified course density.

5. COMPACTION

- a. <u>General</u>:
 - 1) Begin compaction as soon as placed hot-mix paving will bear roller weight Without excessive displacement.
 - 2) Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 - 3) Complete compaction before mix temperature cools to 185°F.
- b. Breakdown Rolling:
 - 1) Complete breakdown or initial rolling immediately after rolling joints and outside edge.
 - 2) Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness.
 - 3) Correct laydown and rolling operations to comply with requirements.
- c. Intermediate Rolling:
 - 1) Begin intermediate rolling immediately after breakdown rolling while hotmix asphalt is still hot enough to achieve specified density.
 - 2) Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 3) <u>Average Density</u>: 92% of reference maximum theoretical density according to ASTM D 2041, but not less than 90% nor greater than 96%.
- d. Finish Rolling:
 - 1) Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- e. <u>Edge Shaping</u>:
 - 1) While surface is being compacted and finished, trim edges of pavement to proper alignment.
 - 2) Bevel edges while asphalt is still hot; compact thoroughly.
- f. <u>Repairs</u>:
 - 1) Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt.
 - 2) Compact by rolling to specified density and surface smoothness.
- g. <u>Protection</u>: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- h. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

6. INSTALLATION TOLERANCES

- a. <u>Thickness</u>: Compact each course to produce the thickness indicated within the following tolerances:
 - 1) <u>Base Course</u>: Plus 1/2", no minus.
 - 2) <u>Surface Course</u>: Plus 1/4", no minus.
- b. <u>Surface Smoothness</u>: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10' straightedge applied transversely or longitudinally to paved areas.

- 1) <u>Base Course</u>: 1/4".
- 2) <u>Surface Course</u>: 1/8".
- 3) <u>Crowned Surfaces</u>:
 - a) Test with crowned template centered and at right angle to crown.
 - b) Maximum allowable variance from template is 1/4".

7. PAVEMENT MARKING

- a. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- b. Sweep and clean surface to eliminate loose material and dust.
- c. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges.
 - 1) Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

8. FIELD QUALITY CONTROL

- a. <u>Testing Agency</u>: Owner may elect to retain a qualified independent testing and inspecting agency to perform field tests, inspections and to prepare test reports.
 - 1) Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- b. Any required retests and reinspects for failed work will be at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- c. <u>Thickness</u>: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- d. <u>Surface Smoothness</u>: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- e. <u>In-Place Density</u>: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1) Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2) In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a) One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three (3) cores taken.
 - b) Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- f. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

32 13 13 - CONCRETE PAVING

- A. SCOPE
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u> Specifications sections, apply to work of this section.
 - b. <u>Related Work Specified Elsewhere:</u> 1) Section 31 00 00 EARTHWORK.
 - 2. DESCRIPTION OF WORK
 - a. Extent of portland cement concrete paving is shown on drawings, including curbs, walkways and pavements.
 - b. Prepared subbase is specified in Section <u>31 00 00 EARTHWORK</u>..
 - 3. SUBMITTALS
 - a. Furnish samples, manufacturer's product data, test reports, and materials certifications as required in referenced sections for concrete and joint fillers and sealers.
 - 4. JOB CONDITIONS
 - a. <u>Traffic Control</u>:
 - 1) Maintain access for vehicular and pedestrian traffic as required for other construction activities.
 - 2) Utilize flagmen, barricades, warning signs and warning lights as required.
 - 5. QUALITY ASSURANCES
 - a. Owner will retain testing laboratory to perform testing and inspection service for quality control testing during concrete operations.
 - 1) Contractor to notify Architect when work is ready for testing.
 - b. All concrete work within public right-of-ways shall be in accordance with City of South Bend standards.

B. PRODUCTS

- 1. MATERIALS
 - a. <u>Forms</u>:
 - 1) Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.
 - 2) Use straight forms, free of distortion and defects.

- b. <u>Concrete Materials</u>: Comply with requirements of applicable Indiana Department of Transportation Standard Specifications for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- c. <u>Reinforcement</u>: Collated, fibrillated, polypropylene fibers for secondary reinforcement of concrete slabs. Subject to compliance with requirements, provide one of the following:
 - 1) Super-Net by FORTA Corporation
 - 2) Fiberstrand F by Euclid Chemical Company
 - 3) Grace Fibers by W.R. Grace & Co.
 - 4) Fibermesh 300 by Propex
 - 5) Or approved equal.
- d. <u>Reinforcing Bars</u>: Deformed steel bars, ASTM A 615, Grade 40.
- e. <u>Joint Sealant</u>: One component, self-leveling, non-priming urethane sealant SL-1 by Master Seal or approved equal.
- f. <u>Curing Compound</u>: Sprayable, acrylic-based transparent polymer solution, MasterKure CC 180WB by BASF or approved equal.
- 2. CONCRETE MIX, DESIGN AND TESTING
 - a. Comply with requirements of applicable Division <u>32 EXTERIOR</u> <u>IMPROVEMENTS</u> for concrete mix design, sampling and testing, and quality control, and as herein specified.
 - b. Design mix to produce standard-weight concrete consisting of portland cement, limestone aggregate, water-reducing or high-range water-reducing admixture (super-plasticizer), air-entraining admixture and water to produce the following properties:
 - 1) <u>Compressive Strength</u>: 4000 psi, minimum at twenty-eight (28) days.
 - 2) <u>Slump Range</u>: 4" to 6".
 - 3) <u>Air Content</u>: 5% to 8%.
 - 4) Fiber Reinforcement: 1.5 lbs./cu.yd.

C. EXECUTION

- 1. SURFACE PREPARATION
 - a. Remove loose material from compacted subgrade or subbase surface immediately before placing concrete.
 - b. Proof-roll prepared subgrade or subbase surface to check for unstable areas and need for additional compaction.
 - 1) Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- 2. FORM CONSTRUCTION
 - a. Set forms to required grades and lines, rigidly braced and secured.
 - 1) Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least twenty-four (24) hours after concrete placement.

- b. Check completed formwork for grade and alignment to following tolerances:
 - 1) Top of forms not more than 1/8" in 10'.
 - 2) Vertical face on longitudinal axis, not more than 1/4" in 10'.
- c. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3. CONCRETE PLACEMENT

- a. Do not place concrete until subgrade or subbase and forms have been checked for line and grade.
 - 1) Moisten subbase if required to provide a uniform dampened condition at time concrete is placed.
 - 2) Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- b. Place concrete using methods which prevent segregation of mix.
 - 1) Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator.
 - 2) Keep vibrator away from joint assemblies, reinforcement, or side forms.
 - 3) Use only square-faced shovels for hand-spreading and consolidation.
 - 4) Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
- c. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible.
 - 1) If interrupted for more than 1/2 hour, place a construction joint.
- 4. JOINTS
 - a. <u>General</u>:
 - 1) Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete.
 - 2) Construct transverse joints at right angles to the centerline, unless otherwise indicated.
 - 3) When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.
 - b. <u>Weakened-Plane (Contraction) Joints</u>: Provide weakened-plane (contraction) joints, sectioning concrete into areas indicated on drawings. Construct weakened-plane joints for a depth shown on drawings, as follows:
 - 1) <u>Sidewalks Tooled Joints</u>: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
 - 2) <u>Pavements Sawn Joints</u>:
 - a) Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades.
 - b) Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
 - c. <u>Construction Joints</u>: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such pours terminate at expansion joints.

- d. <u>Expansion Joints</u>: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.
 - 1) Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated.
 - a) If no joint sealer, place top of joint filler flush with finished concrete surface.
 - 2) Furnish joint fillers in one-piece lengths for full width being placed, wherever possible.
 - a) Where more than one length is required, lace or clip joint filler sections together.
 - 3) Protect top edge of joint filler during concrete placement with a cap or other temporary material.
 - a) Remove protection after concrete has been placed on both sides of joint.
- e. <u>Fillers and Sealants</u>:
 - 1) Use joint filler to achieve required joint depths, to allow sealants to perform properly.
 - 2) Depth of sealants shall be 1/2".
 - 3) Do not install sealants in joints less than a minimum of 1/4" wide or more than 1" wide, unless otherwise directed by Architect. Install per manufacturer's recommendations.

5. CONCRETE FINISHING

- a. After striking-off and consolidating concrete, smooth surface by screeding and floating.
 - 1) Use hand methods only where mechanical floating is not possible.
 - 2) Adjust floating to compact surface and produce uniform texture.
 - 3) After floating, test surface for trueness with a 10' straightedge.
 - 4) Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide a continuous smooth finish.
- b. Work back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated.
 - 1) Eliminate tool marks on concrete surface.
- c. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 - 1) Broom finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic.
 - 2) Repeat operation if required to provide a fine line texture acceptable to Architect.
 - 3) On inclined slab surfaces, provide a coarse non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.
- d. Do not remove forms for twenty-four (24) hours after concrete has been placed.
 - 1) After form removal, clean ends of joints and point-up any minor honeycombed areas.
 - 2) Remove and replace areas or sections with major defects, as directed by Architect.
- 6. CURING

- a. Protect and cure finished concrete paving, complying with applicable requirements.
 - 1) Use membrane-forming curing and sealing compound or approved moist-curing methods.
- b. <u>Anti-Spalling Treatment:</u>
 - A second coat of curing and sealing compound may be used or an antispalling compound applied over concrete cured by continuous moist curing methods.
 - Apply compounds to concrete surfaces no sooner than twenty-eight (28) days after placement, to clean, dry concrete free of oil, dirt, and other foreign material.
 - 3) Apply curing and sealing compound at a maximum coverage rate of 300 sq. ft./gallon.
 - 4) Apply anti-spalling compound in two sprayed applications.
 - 5) First application at rate of 40 sq.yds. per gal; second application, 60 sq. yds. per gallon.
 - 6) Allow complete drying between applications.
- 7. FIELD QUALITY CONTROL
 - a, <u>Testing Agency</u>: Owner shall retain a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - b. <u>Testing Services</u>: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1) <u>Testing Frequency:</u> Obtain at least one (1) composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
 - 2) When frequency of testing will provide fewer than five compressivestrength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - <u>Slump</u>: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one (1) test for each day's pour of each concrete mix.
 - 4) Perform additional tests when concrete consistency appears to change.
 - 5) <u>Air Content</u>: ASTM C 231, pressure method; one (1) test for each composite sample, but not less than one (1) test for each day's pour of each concrete mix.
 - 6) <u>Concrete Temperature</u>: ASTM C 1064; one (1) test hourly when air temperature is 40°F and below and when 80°F and above, and one (1) test for each composite sample.
 - <u>Compression Test Specimens</u>: ASTM C 31/C 31M; cast and laboratory cure one set of three (3) standard cylinder specimens for each composite sample.
 - 8) <u>Compressive-Strength Tests</u>: ASTM C 39/C 39M; test one (1) specimen at seven (7) days and two (2) specimens at twenty-eight (28) days.
 - a) A compressive-strength test shall be the average compressive strength from two (2) specimens obtained from same composite sample and tested at twenty-eight (28) days.

- c. Strength of each concrete mix will be satisfactory if average of any three (3) consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- d. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within forty-eight (48) hours of testing.
 - Reports of compressive-strength tests shall contain:
 - a) Project identification name and number.
 - b) Date of concrete placement.
 - c) Name of concrete testing and inspecting agency.
 - d) Location of concrete batch in Work.
 - e) Design compressive strength at twenty-eight (28) days.
 - f) Concrete mixture proportions and materials.
 - g) Compressive breaking strength.
 - h) Type of break for both seven (7) and twenty-eight (28) day tests.
- e. <u>Nondestructive Testing</u>: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- f. <u>Additional Tests</u>: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- g. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- h. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

8. REPAIRS AND PROTECTIONS

1)

- a. Repair or replace broken or defective concrete, as directed by Architect.
- b. Drill test cores where directed by Architect, when necessary to determine magnitude of cracks or defective areas.
 - 1) Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- c. Protect concrete from damage until acceptance of work.
 - 1) Exclude traffic from pavement for at least fourteen (14) days after placement.
 - 2) When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- d. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

SECTION 32 90 00 - PLANTING

A. SCOPE

1. RELATED DOCUMENTS

- a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division <u>1 GENERAL CONDITIONS</u>, apply to this Section.
- b. See Section <u>32 92 00 TURF AND GRASSES</u> for finish grading and grass seeding of lawn areas.

2. SUMMARY

a. This Section includes trees and shrubs.

3. DEFINITIONS

- a. <u>Balled and Burlapped Stock</u>: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.
- b. <u>Container-Grown Stock</u>:
 - 1) Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container.
 - 2) Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.
- c. <u>Finish Grade</u>: Elevation of finished surface of planting soil.
- d. <u>Planting Soil</u>:
 - 1) Native or imported topsoil.
 - 2) Manufactured topsoil.
 - 3) Or surface soil modified to become topsoil.
 - 4) Mixed with soil amendments.
- e. <u>Subgrade</u>: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- 4. SUBMITTALS
 - a. <u>Product Data</u>: For each type of product indicated.
 - b. <u>Product Certificates</u>: For each type of manufactured product, signed by product manufacturer, and complying with the following:
 - 1) Manufacturer's certified analysis for standard products.

- c. <u>Maintenance Instructions</u>:
 - 1) Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year.
 - 2) Submit before expiration of required maintenance periods.

5. QUALITY ASSURANCE

- a. Installer Qualifications:
 - 1) A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 2) Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.
- b. Provide quality, size, genus, species, and variety of exterior plants indicated, grown in a nursery in northern Indiana, northern Illinois, Wisconsin, Michigan, or northern Ohio suited for Zone 4 or 5, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- c. <u>Tree and Shrub Measurements</u>:
 - 1) Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position.
 - 2) Do not prune to obtain required sizes.
 - 3) Take caliper measurements 6" above ground for trees up to 4"caliper size, and 12" above ground for larger sizes.
 - 4) Measure main body of tree or shrub for height and spread.a) Do not measure branches or roots tip-to-tip.
- d. <u>Observation</u>:
 - 1) Architect will observe trees and shrubs at project site before planting for compliance with requirements for genus, species, variety, size, and quality.
 - Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work.
 - 3) Remove rejected trees or shrubs immediately from Project site.
 - 4) Notify Architect of planting materials four (4) days in advance of delivery to site.
- e. <u>Preinstallation Conference</u>: Conduct conference at Project site to comply with requirements in Section <u>01 31 13 PROJECT COORDINATION.</u>

6. DELIVERY, STORAGE AND HANDLING

- a. Deliver exterior plants freshly dug.
- b. Do not prune trees and shrubs before delivery, except as approved by Architect.
- c. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage.
- d. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape.

- e. Provide protective covering of exterior plants during delivery.
- f. Do not drop exterior plants during delivery.
- g. Handle planting stock by root ball.
- h. Deliver exterior plants after preparations for planting have been completed and install immediately.
- i. If planting is delayed more than six (6) hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1) Set balled stock on ground and cover ball with soil, peat moss or other acceptable material.
 - 2 Do not remove container-grown stock from containers before time of planting.
 - 3) Water root systems of exterior plants stored on-site with a fine-mist spray.
 - a) Water as often as necessary to maintain root systems in a moist condition.

7. COORDINATION

- a. <u>Weather Limitations</u>: Proceed with planting only when existing and forecasted weather conditions permit.
- b. <u>Coordination with Lawns</u>:
 - 1) Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Architect.
 - 2) When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

8. WARRANTY

- a. <u>Special Warranty</u>: Warrant exterior plants for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
- b. <u>Warranty Period for Trees, Shrubs, and Plants</u>:
 - One (1) year from date of Substantial Completion.
 - a) Remove dead exterior plants immediately.
 - b) Replace immediately unless required to plant in the succeeding planting season.
 - c) Replace exterior plants that are more than 25% dead or in an unhealthy condition at end of warranty period.
 - A limit of one (1) replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.
- 9. MAINTENANCE

1)

a. <u>Trees, Shrubs, and Plants</u>:
- 1) Begin maintenance immediately after planting. Maintain trees, shrubs and landscaping until final acceptance. Total maintenance period shall be thirty (30) days from date of Substantial Completion.
- 2) Maintain by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings.
- 3) Spray as required to keep plant materials free of insects and disease.
- 4) Restore or replace damaged tree wrappings.

- 1. TREE AND SHRUB MATERIAL
 - a. Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning.
 - b. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- 2. SHADE AND FLOWERING TREES
 - a. Provide balled and burlapped single-stem trees with straight trunk, branching height of 1/3 to 1/2 of tree height, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
- 3. DECIDUOUS SHRUBS
 - a. Provide balled and burlapped or container-grown shrubs deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
- 4. TOPSOIL
 - a. ASTM D 5268, pH range of 5.5 to 7, a minimum of 6% organic material content; free of stones 3/4" or larger in any dimension and other extraneous materials harmful to plant growth.
 - b. <u>Topsoil Source</u>:
 - 1) Reuse surface soil stockpiled on-site.
 - 2) Verify suitability of stockpiled surface soil to produce topsoil.
 - 3) Screen to clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - c. Supplement with imported or manufactured sandy loam or loamy sand topsoil from off-site sources when quantities are insufficient.
 - 1) Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4" deep; do not obtain from agricultural land, bogs or marshes.
- 5. ORGANIC SOIL AMENDMENTS

- a. <u>Peat</u>: Fibric sphagnum peat moss, partially decomposed, finely divided, or granular texture, with a pH range of 3.4 to 4.8.
- b. <u>Root Watering Crystals</u>: Terra-Sorb, potassium-based co-polymer, coarse gradesize crystals, 2-4 mm.
- 6. FERTILIZER
 - a. <u>Slow-Release Fertilizer</u>: Nutri-Pak 16:8:8, 3-year slow release fertilizer packet by:
 1) JRP International, Inc.,
 - 2) Or approved equal.
- 7. MULCHES
 - a. <u>Organic Mulch</u>:
 - 1) Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of processed fine shredded natural hardwood bark, uniform in size, dark brown in color.
 - 2) Colored, dyed mulch is not acceptable.
 - 3) Submit sample for review and approval.
 - b. <u>Gravel Mulch</u>: Hard, durable riverbed gravel, washed free of loam, sand, clay and other foreign substances. 3/4" to 1-1/2" size, uniform tan-beige color range.
 - 1) Submit sample for review and approval.

8. MISCELLANEOUS PRODUCTS

- a. Metal Edging:
 - 1) Commercial aluminum or steel edging, 1/8" thick and 4" wide and fabricated in sections.
 - 2) Provide edging and tapered stakes with manufacturer's standard finish.
 - a) Permaloc Aluminum Edging
 - b) Ryerson Steel Edging
 - c) Or approved equal
- 9 PLANTING SOIL MIX
 - a. <u>Planting Soil Mix</u>: Prepare soil mixes with the following soil amendments and fertilizers in the following quantities:
 - 1) <u>General soil mix for trees and shrubs</u>:
 - a) 50% topsoil
 - b) 50% subsoil
 - 2) Incorporate Root Watering Crystals into planting mix at the following rates:
 - a) <u>Trees</u>: 2" caliper = 4 ounces, 3" caliper = 1 cup
 - b) <u>Shrubs</u>: 1 gallon = $\frac{1}{2}$ ounce, 3 gallon = 1 ounce, 5 gallon 1-1/2 ounces

C. EXECUTION

1. EXAMINATION

- a. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.
- b. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- a. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- b. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- c. Lay out individual tree and shrub locations and areas for multiple exterior plantings.
 - 1) Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting.
 - 2) Make minor adjustments as required.

3. TREE AND SHRUB EXCAVATION

- a. <u>Pits and Trenches</u>:
 - 1) Excavate circular pits with sides sloped inward approximately two times as wide as ball diameter for balled and burlapped and container-grown stock.
 - 2) Trim base leaving center area raised slightly to support root ball and assist in drainage.
 - a) Do not further disturb base.
 - 3) Scarify sides of plant pit smeared or smoothed during excavation.
 - 4) <u>Fill excavations with water and allow to percolate away before</u> positioning trees and shrubs.
- b. Obstructions:
 - 1) Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 - 2) Break up hardpan or compacted soils encountered at bottom of planting excavations.
- c. <u>Drainage</u>: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

4. TREE AND SHRUB PLANTING

- a. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
- b. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls.
- c. Remove pallets, if any, before setting.

- d. Do not use planting stock if root ball is cracked or broken before or during planting operation.
- e. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets.
- f. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill.
 - 1) Repeat watering until no more water is absorbed.
 - 2) Water again after placing and tamping final layer of planting soil mix.
- g. Set container-grown stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
 - 1) Carefully remove root ball from container without damaging root ball or plant.
 - 2) Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets.
 - 3) When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill.
 - a) Repeat watering until no more water is absorbed.
 - b) Water again after placing and tamping final layer of planting soil mix.
- h. <u>Organic Mulching</u>:
 - 1) Apply 3" average thickness of organic mulch extending 12" beyond edge of planting pit or trench.
 - 2) Do not place mulch within 3" of trunks or stems.
- i. <u>Gravel Mulching</u>:
 - 1) Apply 3" average thickness of gravel mulch over weed barrier fabric in beds as noted.
- j. Install landscape edging along perimeter of all planting beds.
- 5. TREE AND SHRUB PRUNING
 - a. Prune, thin, and shape trees and shrubs according to standard horticultural practice and as directed by Architect.
 - b. Prune trees to retain required height and spread.
 - c. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees.
 - d. Prune shrubs to retain natural character.
 - 1) Shrub sizes indicated are sizes after pruning.
- 6. PLANT PLANTING
 - a. Set out and space plants as indicated.
 - b. Dig holes large enough to allow spreading of roots and backfill with planting soil.

- c. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- d. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- e. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
- 7. PLANTING BED MULCHING
 - a. Mulch backfilled surfaces of planting beds.
 - b. <u>Organic Mulch</u>:
 - 1) Apply 3"- 4" average thickness of organic mulch, and finish level with adjacent finish grades.
 - 2) Do not place mulch against plant stems.
- 8. CLEAN UP AND PROTECTION
 - a. During exterior planting, keep adjacent paving and construction clean and work area in an orderly condition.
 - b. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others.
 - c. Maintain protection during installation and maintenance periods.
 - d. Treat, repair, or replace damaged exterior planting.
- 9. DISPOSAL
 - a. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

32 90 00 - TURF AND GRASSES

- A. SCOPE
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to this Section.

2. SUMMARY

- a. <u>This Section includes the following</u>:
 - 1) Open Lawn Seeding.
 - 2) Open Lawn Sodding.
 - 3) No-Mow Lawn Seeding.
 - 4) Temporary Cover Seeding.
- b. <u>Related Sections include the following</u>:
 - 1) Section <u>32 90 00 PLANTING</u> for landscape plantings.

3. DEFINITIONS

- a. <u>Finish Grade</u>: Elevation of finished surface of planting soil.
- b. <u>Planting Soil</u>: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- c. <u>Subgrade</u>: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.
- 4. SUBMITTALS
 - a. <u>Product Data</u>: For each type of product indicated.
 - b. <u>Certification of Grass Seed</u>: From vendor for each lawn grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - c. <u>Maintenance Instructions</u>: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year.
 - 1) Submit before expiration of required maintenance periods.

5. QUALITY ASSURANCE

- a. <u>Installer's Field Supervision</u>: Require Installer to maintain an experienced fulltime supervisor on Project site when planting is in progress.
- b. <u>Pre-installation Conference</u>: Conduct conference at Project site to comply with requirements in Section <u>01 31 13 PROJECT COORDINATION</u>.
- 6. DELIVERY, STORAGE AND HANDLING

- a. <u>Seed</u>: Deliver seed in original sealed, labeled, and undamaged containers.
- b. <u>Sod</u>: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

7. SCHEDULING

- a. <u>Weather Limitations</u>: Proceed with planting only when existing and forecasted weather conditions permit.
- b. Coordinate lawn operations with other construction activity to avoid disturbance to newly seeded and sodded areas.

- 1. SEED
 - a. <u>Open Lawn Grass Seed</u>: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances by Athletic Pro II Mixture Jacklin Seed or approved equal. State-certified seed of grass species, proportioned by weight as follows as follows:
 - 1) Kentucky Bluegrass 50% (a blend of 2 premium varieties Blue Chip, Everest, Liberator, NuBlue)
 - 2) Perennial Ryegrass 50% (a blend of 2 premium varieties Accent, Caddieshack II, Top Gun II)
 - b. <u>No-Mow Lawn Seed</u>: Fresh, clean, dry, new-crop seed "Scottish Links" by Jacklin Seed or approved equal, complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
 - C. Lawn Sod:
 - 1) Certified turfgrass sod complying with ASPA specifications for machinecut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses.
 - 2) Provide viable sod of uniform density, color, and texture of premium bluegrass turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.
 - d. <u>Temporary Seed Cover</u>: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology.
 - 1 Avena Sativa Seed Oats
 - 2) Lolium Multiforum Annual Ryegrass
- 2. TOPSOIL
 - a. <u>Topsoil</u>: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6% organic material content; free of stones 3/4" or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1) <u>Topsoil Source</u>:
 - a) Reuse surface soil stockpiled on-site.
 - b) Verify suitability of stockpiled surface soil to produce topsoil.

- c) Screen existing soils to clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
- d) Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient.
- e) Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4" deep; do not obtain from agricultural land, bogs or marshes.

3. PLANTING ACCESSORIES

a. <u>Selective Herbicides</u>: EPA registered and approved, of type recommended by manufacturer for application.

4. FERTILIZER

- a. <u>Commercial Fertilizer</u>: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50% derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1) <u>Composition</u>: 1 lb/1000 sq. ft. of actual nitrogen, 4% phosphorous, and 2% potassium, by weight.

5. MULCHES

a. <u>Hydromulch</u>: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15% and a pH range of 4.5 to 6.5. Conwed Fibers Cellulose by Profile Products, LLC. or approved equal.

C. EXECUTION

1. EXAMINATION

- a. Examine areas to receive open lawns and no-mow seeding for compliance with requirements and other conditions affecting performance.
- b. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- a. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- b. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- 3. LAWN PREPARATION
 - a. Coordinate lawn work with exterior plantings and irrigation work.
 - b. Limit lawn subgrade preparation to areas to be planted.

- c. <u>Newly Graded Subgrades:</u> Loosen subgrade to a minimum depth of 4". Remove stones larger than 3/4" in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1) Apply a glyphosate herbicide to lawn areas for eradication of weeds, etc.
 - 2) Wait seventy (72) hours minimum after herbicide application before applying commercial fertilizer on surface, and thoroughly blend into soil mix.
- d. <u>Unchanged Subgrades</u>: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
 - Remove existing grass, vegetation, and turf.
 - a) Do not mix into surface soil.
 - b) Apply glyphosate herbicide to lawn areas for eradication of weeds, etc.
 - 2) Loosen surface soil to a depth of at least of 6".
 - a) Apply soil amendments and fertilizers and mix thoroughly into top 4" of soil.
 - b) Till soil to a homogeneous mixture of fine texture.
 - 3) Remove stones larger than 3/4" in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4) Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- e. <u>Finish Grading</u>:

1)

- 1) Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture.
- 2) Grade to within plus or minus 1/2" of finish elevation.
- 3) Roll and rake, remove ridges, and fill depressions to meet finish grades.
- 4) Limit fine grading to areas that can be planted in the immediate future.
- f. Moisten prepared lawn areas before planting if soil is dry.
 - 1) Water thoroughly and allow surface to dry before planting.
 - 2) Do not create muddy soil.
- g. Restore areas if eroded or otherwise disturbed after finish grading and before planting.
- 4. LAWN GRASS SEEDING
 - a. Sow lawn grass seed with spreader or seeding machine.
 - b. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - c. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - d. Lawn seed at the following rates:
 - 1) <u>Open Lawn Seed Areas</u>: 260 lb/acre (6 lb/1000 sq. ft.)
 - 2) <u>No-Mow Seed Areas</u>: 200 lb/acre (4-1/2 lb/1000 sq. ft.)
 - 3) <u>Temporary Cover Seed for all No-Mow Seed Areas</u>:
 - a) Seed Oats 32 lb/acre (3/4 lb/1,000 sq. ft.)
 - b) Annual Rye 5 lb/acre (1/8 lb/1,000 sq. ft.)

- e. Rake seed lightly into top 1/8" of topsoil, roll lightly, and water with fine spray, protect <u>all</u> newly seeded areas with hydromulch with application rate of 1,500 lbs./acre.
- 5. SODDING NEW LAWNS
 - a. Lawn areas as noted on drawings shall be sodded.
 - b. Lay sod within twenty-four (24) hours of stripping.
 - c. Do not lay sod if dormant or if ground is frozen.
 - d. Lay sod over grass pavers in expanded parking area in lower parking lot to form a solid mass with tightly fitted joints.
 - e. Butt ends and sides of sod; do not stretch or overlap.
 - f. Stagger sod strips or pads to offset joints in adjacent courses.
 - g. Avoid damage to subgrade or sod during installation.
 - h. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.
 - i. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - j. Saturate sod with fine water spray within two (2) hours of planting.
 - k. During the first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2" below the sod.

6. LAWN RENOVATION

- a. Renovate existing lawn areas damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
- b. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
- c. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil
- d. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- e. Mow, dethatch, core aerate, and rake existing lawn.
- f. Remove weeds before seeding.
 - 1) Where weeds are extensive, apply selective herbicides as required.
 - 2) Do not use pre-emergence herbicides.

- g. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- h. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6"
- i. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4" of existing soil.
- j. Provide new planting soil to fill low spots and meet finish grades.
- k. Apply seed and protect with hydromulch as required for new lawns.
- I. Water newly planted areas and keep moist until new lawn is established.
- 7. SATISFACTORY LAWNS
 - a. <u>Satisfactory Lawns</u>: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90% over any 10 sq. ft. and bare spots not exceeding 4 by 4".
 - b. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

8. LAWN MAINTENANCE

- a. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods.
 - 1) <u>Seeded Areas</u>: 60 days after date of Substantial Completion.
 - 2) <u>Sodded Areas</u>: 30 days after date of Substantial Completion.
- b. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.
- c. Maintain and establish lawns by fertilizing, weeding, replanting, and other operations.
- d. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
- e. <u>Watering</u>: Contractor shall monitor lawns, notify Owner of watering needs or problems.
- f. Owner will mow open lawn areas as soon as there is enough top growth to cut with mower set at specified height for the lawn.
 - 1) Monitor Owner's mowing operations.
 - 2) Provide recommendations for proper mowing of newly seeded areas.
- g. <u>Post-Fertilization</u>:
 - 1) Contractor shall apply fertilizer to open lawn areas after first mowing and when grass is dry.
 - 2) Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of lawn area.

h. Maintenance by Owner shall not begin until final acceptance.

9. CLEAN UP AND PROTECTION

- a. Promptly remove soil and debris created by lawn work from paved areas.
- b. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- c. Erect barricades and warning signs as required to protect newly planted areas from traffic.
- d. Maintain barricades throughout maintenance period and remove after lawn is established.
- e. Remove any remaining erosion-control measures after grass establishment period.

33 00 00 - SITE UTILITIES

- A. SCOPE
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to work of this section.
 - b. <u>Related Work Specified Elsewhere</u>:
 - 1) Section <u>31 00 00 EARTHWORK</u>.
 - 2) Section 31 25 00 EROSION AND SEDIMENT CONTROL
 - 2. DESCRIPTION OF WORK
 - a. <u>Site utilities work is from municipal services to a point five (5) feet outside the building line, includes, but is not limited to</u>:
 - 1) Extension of water service.
 - 2) Extension of sanitary sewer service.

3. JOB CONDITIONS

- a. <u>Traffic</u>:
 - 1) Conduct site utilities operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
 - 2) Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- b. Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
- c. Protect improvements on adjoining properties and on Owner's property.
- d. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.
- 4. QUALITY ASSURANCE
 - a. All work shall comply with applicable Federal, State, Local standards and requirements including City of South Bend for installation of utilities and connections.

- 1. SANITARY SEWER PIPE
 - a. Shall be one of the following: PVC Pipe with Sch. 40 PVC fittings and with gasketed compression-type joints. Pipe shall be one of the following:
 - 1) ASTM-D 2665
 - 2) ASTM-D 3034 SDR 26
 - 3) ASTM-D 2241 SDR 13.5, 17, 21, or 26
 - b. Waterworks grade ductile iron pipe with mechanical or tyton joints.

- 2. 4" WATER MAIN PIPING
 - a. Waterworks grade ductile iron pipe with mechanical or tyton joints.
- 3. 2" WATER MAIN PIPING
 - a. Type K Copper tubing

C. EXECUTION

- 1. TRENCHING, BEDDING AND BACKFILLING
 - a. Contractor shall provide and maintain shoring and bracing as necessary to maintain walls of excavations and shall be responsible for any damage done to persons or adjoining property as the result of improper shoring or excavation.
 - b. Trenches shall be excavated to a depth not less than 4" below the pipe and shall be dry when bottom is prepared.
 - 1) The trench shall be prepared using "subbase" material thoroughly compacted.
 - 2) Pipe shall be placed so it is supported over the entire length.
 - c. After the pipe is placed, aligned and graded, additional "subbase" material shall be added and compacted by hand in 6" layers.
 - 1) Place a minimum of 12" of "subbase" material over pipes before using "satisfactory" fill.

2. WATER SERVICE

- a. Contractor shall furnish and install complete water service, including but not limited to on-site water piping, connection to municipal main, testing, disinfection, and all trenching & backfill.
 - 1) All testing and disinfection of mains shall be in accordance with South Bend Waterworks.
- 3. SANITARY SEWER SERVICE
 - a. Contractor shall furnish and install complete sanitary sewer service, including but not limited to on-site sewer piping, connection to municipal manhole, cleanouts, testing, cleaning, and all trenching & backfill.
- 4. DISPOSAL OF WASTE MATERIALS
 - a. Remove waste materials and unsuitable and excess soils from Owner's property and dispose off site in a legal manner.

33 41 00 - STORM UTILITY DRAINAGE

- A. SCOPE
 - 1. RELATED DOCUMENTS
 - a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division <u>1 GENERAL REQUIREMENTS</u>, apply to this Section.
 - 2. SUMMARY
 - a. <u>This Section includes removal of existing storm drainage system and installation</u> of a new gravity-flow, non-pressure storm drainpipe system outside the building, with the following components:
 - 1) Pre-cast concrete drainage structures.
 - 2) Polypropylene yard inlets.
 - 3) Storm drainage pipe.
 - 4) Storm water retention chamber system.

3. DEFINITIONS

- a. <u>HDPE</u>: High Density Polyethylene plastic.
- b <u>PVC</u>: Polyvinyl chloride plastic.
- 4. SUBMITTALS
 - a. <u>Shop Drawings Required:</u>
 - 1) Precast concrete storm drainage structures. Include plans, elevations, sections, details, frames, covers, and grates.
 - 2) Polypropylene yard inlets. Include manufacturer's product data.
 - 3) Storm drainpipe. Include manufacturer's product data.
 - 4) Storm water retention chamber system. Include manufacturer's product data.
- 5. DELIVERY, STORAGE AND HANDLING
 - a. Do not store pipe, and fittings in direct sunlight.
 - 1) Protect pipe, pipe fittings, and seals from dirt and damage.
 - b. Handle storm drainage structures and piping according to manufacturer's written rigging instructions.

- 1. HDPE PIPING AND FITTINGS
 - a. <u>Corrugated HDPE Drainage Pipe (non-perforated pipe) and Fittings NPS 3 to</u> <u>NPS 10</u>: AASHTO M 252M, Type S, with smooth waterway for coupling joints. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

- b. <u>Corrugated HDPE Pipe (perforated and non-perforated pipe as noted on</u> <u>drawings) and Fittings NPS 12 to NPS 60</u>: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
- c. <u>Soiltight Couplings</u>: AASHTO M 294M, corrugated, matching pipe and fittings.
- 2. PVC PIPE AND FITTINGS
 - a. PVC Storm Sewer Pipe and Fittings, Schedule 40.
 - b. For storm sewers within 18" vertical distance or within 10' horizontal distance of potable water lines, shall be:
 - 1) PVC ASTM-D 3034 SDR 26 with gasketed compression-type joints.
 - 2) Waterworks grade ductile iron pipe with mechanical or tyton joints.
- 3. STORM DRAINAGE STRUCTURES
 - a. <u>Standard Precast Concrete Catch Basins and Curb Inlets</u>:
 - 1) <u>Description</u>: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 2) <u>Base Section</u>: 6" minimum thickness for floor slab and 4" minimum thickness for walls
 - 3) <u>Joint Sealant</u>: ASTM C 990 bitumen or butyl rubber.
 - 4) <u>Grade Rings</u>: Include two (2) or three (3) reinforced-concrete rings, of 6" to 9" total thickness, that match 24" diameter frame and grate.
 - 5) <u>Pipe Connectors</u>: ASTM C 923 resilient, of size required, for each pipe connecting to base section.
 - b. <u>Polypropylene Yard Inlets:</u> 12" polypropylene yard inlet with risers and grate as indicated on drawings.
 - 1) Manufactured by NDS, Inc. or approved equal.
- 4. STORM WATER RETENTION CHAMBER SYSTEM
 - a. StormTech MC-3500
- 5. GEOTEXTILES
 - a. 8 oz./sy nonwoven, needle-punched geotextile made of 100% Polypropylene filaments
- 6. DRAINAGE COURSE
 - a. As noted on drawings.

C. EXECUTION

- 1. EARTHWORK
 - a. Excavation, trenching, and backfilling are specified in Section <u>02 30 00</u> <u>EARTHWORK.</u>
- 2. PIPING INSTALLATION

- a. <u>General Locations and Arrangements:</u>
 - 1) Drawing plans and details indicate general location and arrangement of underground storm drainage piping.
 - 2) Location and arrangement of piping layout take design considerations into account.
 - 3) Install piping as indicated, to extent practical.
 - 4) Where specific installation is not indicated, follow piping manufacturer's written instructions.
- b. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert.
 - 1) Place bell ends of piping facing upstream.
 - 2) Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- c. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected.
 - 1) Reducing size of piping in direction of flow is prohibited.
- d. Install gravity-flow, non-pressure drainage piping according to the following:
 - 1) Install HDPE corrugated sewer piping according to D2321-05 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
 - 2) Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- 3. PRECAST CONRETE STORM DRAINAGE STRUCTURES INSTALLATION
 - a. Excavate hole to diameter of at least 18" greater than outside of structures.
 - b. Install precast concrete catch basins and curb inlets according to the following:
 - 1) Excavate to depth indicated, set structures on undisturbed or compacted subgrade.
 - 2) Extend storm drainpipe $\pm 4^{\circ}$ into catch basin.
 - 3) Backfill and compact around structures.
 - 4) Install cover with frame and grate.
 - 5) Install erosion control protection on all structures.
- 4. POLYPROPYLENE YARD INLETS INSTALLATION
 - a. Polypropylene yard inlets and components to be installed as per manufacturer's recommendations.
 - b. Excavate for polypropylene yard inlets.
 - 1) Place compacted aggregate subbase under inlets as noted on details.
- 5. UNDERGROUND STORM WATER RETENTION CHAMBER SYSTEM INSTALLATION
 - a. Chambers and components for underground storm water retention systems to be installed as per manufacturer's recommendations.
 - b. Excavate for underground storm water retention system.
 - 1) Bottom of excavation shall be undisturbed subgrade or compacted to 95% maximum Modified proctor density.

- c. Line excavation with geotextile filter fabric.
 - 1) Fabric shall line entire bottom, sides and top of underground storm water retention system.
- d. Place bedding layer of aggregate drainage course.
- e. Install chambers and components as shown on drawings.
 - 1) Clean interior of chambers of dirt and superfluous materials as sections are installed.
- f. Connect storm drain piping to chamber systems as shown.
- g. Complete placement of drainage course fill around underground storm water retention system.
 - 1) Overlap geotextile filter fabric over top of drainage stone bed.
 - 2) Overlap and tape joints.

6. FIELD QUALITY CONTROL

- a. Inspect interior of piping to determine whether line displacement or other damage has occurred.
 - 1) Inspect after approximately 24" of backfill is in place, and again at completion of Project.
- b. <u>Defects requiring correction include the following</u>:
 - 1) <u>Alignment</u>: Less than full diameter of inside of pipe is visible between structures.
 - 2) <u>Deflection</u>: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5% of piping diameter.
 - 3) Crushed, broken, cracked, or otherwise damaged piping.
 - 4) <u>Infiltration</u>: Water leakage into piping.
 - 5) <u>Exfiltration</u>: Water leakage from or around piping.
- c. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
- 7. CLEANING
 - a. Flush and clean interior of storm drain piping of dirt and superfluous materials.
 - b. Clean interior of drainage structures at completion of project.
 - c. Clean all catch basins, curb inlets and yard inlets of dirt, sediment, trash and debris.