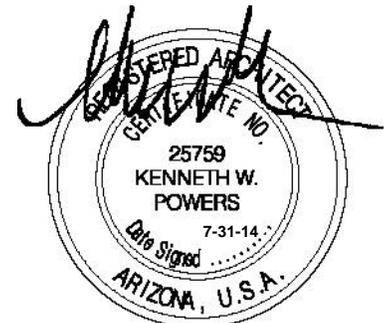


PROJECT MANUAL TECHNICAL SPECIFICATIONS



SKYLINE REGIONAL PARK - PHASE 1

ARCHITECT'S PROJECT NO. 312043
July 31, 2014



EXPIRES: 12-31-2015


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TABLE OF CONTENTS
Skyline Regional Park Phase 1

SECTION	TITLE	NO. OF PAGES
CS	Cover Sheet	1
00 01 10	Table of Contents	3
 DIVISION 01 - GENERAL REQUIREMENTS		
01 11 00	Summary of Work	3
01 26 13	Requests for Interpretation	3
01 29 00	Payment Procedures	1
01 31 19	Project Meetings	1
01 33 00	Submittal Procedures	3
01 42 00	References	3
01 45 00	Quality Control	2
01 50 00	Temporary Facilities and Controls	5
01 60 00	Materials and Equipment	3
01 73 00	Execution Requirements	2
01 73 29	Cutting and Patching	3
01 77 00	Closeout Procedures	3
 DIVISION 02 – EXISTING CONDITIONS		
Not Applicable		
 DIVISION 03 - CONCRETE		
03 05 05	Fly Ash	2
03 10 00	Concrete Formwork	4
03 20 00	Concrete Reinforcement	2
03 30 00	Cast-in-Place Concrete	11
03 35 33	Decorative Concrete Finishes	3
 DIVISION 04 - MASONRY		
04 01 20.52	Unit Masonry Cleaning	3
04 05 15	Mortar and Masonry Grout	4
04 05 26	CMU Integral Water Repellent	2
04 22 00	Concrete Unit Masonry	8
 DIVISION 05 - METALS		
05 10 00	Structural Metal Framing	4
05 31 00	Steel Deck	3
05 50 00	Metal Fabrications	6
 DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES		
06 10 00	Rough Carpentry	3
06 40 00	Architectural Woodwork	3

DIVISION 07 - THERMAL & MOISTURE PROTECTION

07 10 00	Water Repellents	5
07 43 13	Metal Roof and Wall Panels	6
07 92 00	Joint Sealers	8

DIVISION 08 – OPENINGS

08 11 13	Steel Doors and Frames	5
08 43 13	Aluminum Framed Storefronts	6
08 71 00	Door Hardware	6
08 80 00	Glazing	5

DIVISION 09 - FINISHES

09 77 33	FRP Wall Panels	2
09 91 00	Painting	12
09 96 23	Anti-Graffiti Coatings	6

DIVISION 10 - SPECIALTIES

10 14 00	Signage	3
10 21 14	Solid Composite Toilet Compartments	4
10 28 13	Toilet Accessories	3

DIVISION 11 - EQUIPMENT

Not applicable

DIVISION 12 - FURNISHINGS

Not applicable

DIVISION 13 - SPECIAL CONSTRUCTION

Not applicable

DIVISION 14 - CONVEYING SYSTEMS

Not applicable

DIVISION 21 – FIRE SUPPRESSION

Not applicable

DIVISION 22 – PLUMBING

22 00 00	Plumbing	8
----------	----------	---

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

23 00 00	Mechanical	14
----------	------------	----

DIVISION 25 – INTEGRATED AUTOMATION

Not applicable

DIVISION 26 – ELECTRICAL

26 00 00	Basic Electrical Materials and Methods	12
----------	--	----

DIVISION 27 – COMMUNICATION

Not applicable

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Not applicable

DIVISION 31 – EARTHWORK

By Others

DIVISION 32 – EXTERIOR IMPROVEMENTS

By Others

DIVISION 33 – UTILITIES

By Others

DIVISIONS 34 – 47

Not applicable

DIVISION 48 – ELECTRICAL POWER GENERATION

Not applicable

END OF TABLE OF CONTENTS

SECTION 01 11 00

SUMMARY OF WORK

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project: Project consists of new site buildings for the Phase 1 improvements for the new Skyline Regional Park located north of I-10 off of Watson Road (South of Maricopa County White Tank Mountain Regional Park). Project includes Gatehouse, Restroom Building and Ramadas. Other Phase 1 improvements, including extension of Watson Road, interior park roads, parking, programming area, camping sites, and wash bridge(s) are by others and not included in this Project Manual.

1.02 DEFINITIONS PERTAINING TO THE CONTRACT DOCUMENTS

- A. Furnish: To purchase and deliver.
- B. Install: To place into final position and connect.
- C. Provide: To furnish and install.
- D. Connect: To make the complete necessary utility connection (water, sewer, gas, electricity, etc.) from the building utility to the piece of equipment to allow that piece of equipment to function as intended (e.g., a gas connection for an oven or cooktop).
- E. "As shown", "as detailed", "as indicated" or words of similar import mean as indicated on the drawings
- F. "As selected", "as approved" or words of similar import mean as selected by, as approved by, or as accepted by the Architect and Owner.
- G. "Approved equal", "or equal" shall mean as approved and accepted by the Architect and Owner.
- H. "Shall" means mandatory.
- I. "As required" means as required by the contract documents.
- J. "As necessary" means essential to the completion of the work.
- K. "Concealed" means not visible in the finished work.
- L. "Exposed" means visible in the finished work.
- M. "Days" means calendar days.
- N. "Working Days" means work days and does not include legal holidays.
- O. Substantial Completion: That stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

1.03 CONTRACTOR USE OF SITE

- A. General: Contractor shall have full use of the site within Contract Limit Lines indicated for construction operations during the construction period.
 - 1. Construction operations, including of materials and equipment and parking for construction personnel shall be limited to areas within contract limit lines indicated or established at commencement of construction by Owner.
 - 2. The Contractor shall be completely responsible for protecting existing native desert areas around construction areas.
 - 3. Removal and relocation of certain desert plant materials shall be coordinated with the Owner and in accordance with Skyline Regional Park Phase 1 Project Requirements under separate cover.
 - 4. Comply with Skyline Regional Park Phase 1 requirements under separate cover for other use of site requirements.

1.04 PERMITS, FEES AND NOTICES

- A. Plan check fees have been paid by the Owner.
- B. The Contractor shall secure and pay for the building permit and for other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required at the time the bids are received or negotiations concluded. This shall include, but not be limited to:
 - 1. Building Permit from the City of Buckeye, Arizona, or Maricopa County, as applicable.
- C. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authority bearing on the performance of the Work.
- D. It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Architect and Owner in writing, and any necessary changes shall be accomplished by appropriate Modification.
- E. If the Contractor performs Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect and Owner, the Contractor shall assume full responsibility therefor and shall bear attributable costs.

1.05 ARCHITECTURAL BARRIERS

- A. It is the desire of the Owner that the facilities and improvements constructed under this Contract meet or exceed the intent of applicable public law concerning prohibition of discrimination, and that no individual be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of this completed Project.
- B. The designers and drafters of these Documents have intended to incorporate those Owner's intentions into these Documents.
- C. It is recognized that there may be products not incorporated into these Documents that may more nearly meet the Owner's desires than those included.

- D. The Owner hereby solicits those providing elements of this Project to bid and contract for the Project as required by these Documents, but at the time of submitting Shop Drawings, or sooner when appropriate, and without causing delay in the Project, to also submit proposals for improving the accessibility of the Project to physically or mentally impaired persons.

1.06 REPRODUCTION OF DRAWINGS

- A. Contractor shall not alter the size of Drawings when making or ordering reproductions.
- B. Only full-size, current Drawings shall be maintained at the Project Site.

1.07 COMMUNICATIONS

- A. All communications with the Architect shall be copied to the Owner's Representative.
- B. All communications with the Architect's consultants shall be through the Architect.

END OF SECTION

SECTION 01 26 13

REQUESTS FOR INTERPRETATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Administrative requirements for requests for information / interpretation.

1.02 DEFINITIONS

- A. Request For Information / Interpretation (RFI):
1. A document submitted by the Contractor requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
 2. A properly prepared request for information / interpretation shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.
 - a. Drawings shall be identified by drawing number and location on the drawing sheet.
 - b. Specifications shall be identified by Section number, page and paragraph.
 3. Requests for Information: Request made by Contractor concerning items not indicated on Drawings or contained in the Project Manual that is necessary to properly perform the Work.
 4. Requests for Interpretation: Request made by Contractor in accordance with Owner's Representative's third party obligations to the contract for construction.
- B. Improper RFI's:
1. RFI's that are not properly prepared.
 2. Improper RFI's will be processed by the Architect at the Architect's standard hourly rate and Architect will charge the Owner, and such costs will be deducted from monies still due the Contractor. The Contractor will be notified by the Architect prior to the processing of improper RFI's.
- C. Frivolous RFI's:
1. RFI's that request information that is clearly shown on the Contract Documents.
 2. Frivolous RFI's may be returned unanswered or may be processed by the Architect at the Architect's standard hourly rate and Architect will charge the Owner, and such costs will be deducted from monies still due the Contractor. The Contractor will be notified by the Architect prior to the processing of frivolous RFI's.

1.03 CONTRACTOR'S REQUESTS FOR INFORMATION

- A. RFI's shall be submitted on Document 00 63 13 included in the Project Manual, or similar form prepared by the Contractor and approved by the Architect prior to use.
1. Forms shall be completely filled in, and if prepared by hand, shall be fully legible.
 2. RFI's shall be submitted in numerical order with no breaks in the consecutive numbering.
 3. Each page of attachments to RFI's shall bear the RFI number and shall be consecutively numbered in chronological order.

4. RFI's shall be submitted by E-Mail or digital file transfer.
 - a. Address for E-Mail will be distributed by the Architect at the Pre-Construction Conference.
 - b. An electronic version of Document 00 63 13 will be provided upon request.

- B. When the Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the Architect shall be requested to make a clarification of the indeterminate item.
 1. Whenever possible, such clarification shall be requested at the next appropriate Project Meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item, Contractor shall prepare and submit an RFI to the Architect.
 2. RFI's may not be sent directly to the Architect's Consultants. All RFI's shall be sent directly to the Architect.

- C. Contractor shall endeavor to keep the number of RFI's to a minimum. In the event that the process becomes unwieldy, in the opinion of the Architect, because of the number and frequency of RFI's submitted, the Architect may require the Contractor to abandon the process and submit future requests as either submittals, substitutions or requests for change.

- D. RFI's shall be originated by the Contractor.
 1. RFI's from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the Architect.
 2. RFI's from subcontractors or material suppliers sent directly to the Owner's Representative, Architect or the Architect's consultants shall not be accepted and will be returned unanswered.

- E. Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous" as noted above.

- F. In cases where RFI's are issued to request clarification of coordination issues, for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's which fail to include a suggested solution will be returned unanswered with a requirement that the Contractor submit a complete request.

- G. RFI's shall not be used for the following purposes:
 1. To request approval of submittals
 2. To request approval of substitutions,
 3. To request changes which are known to entail additional cost or credit. (A Change Order Request form shall be used.)
 4. To request different methods of performing work than those drawn and specified.

- H. In the event the Contractor believes that an RFI response by the Architect results in additional cost or time, Contractor shall not proceed with the work indicated by the RFI until a Change Order (or Construction Change Directive, if applicable to the Project) is prepared and approved. RFI's shall not automatically justify a cost increase in the work or a change in the Project schedule.
 1. Answered RFI's shall not be construed as approval to perform extra work.
 2. Unanswered RFI's will be returned with a stamp or notation "Not Reviewed".

- I. Contractor shall prepare and maintain a log of RFI'S, and at any time requested by the Architect, Contractor shall furnish copies of the log showing outstanding RFI'S. Contractor shall note unanswered RFI's in the log.
- J. Contractor shall allow up to 5 working days review and response time for RFI'S, unless review is required of multiple consultants, then the review and response period shall be 7 working days.
 - 1. The Architect will endeavor to respond to RFI's in a timely manner.
 - 2. RFI shall state requested date/time for response, however, this requested date/time for response is not a guarantee that the RFI will be answered by that date/time if that date/time is too expeditious.
 - 3. Architect may request additional time when deemed necessary.

1.04 ARCHITECT'S RESPONSE TO RFI'S

- A. Architect will respond to RFI's on one of the following forms:
 - 1. Answers to properly prepared RFI's will be made directly upon the RFI form and will be returned via E-Mail or digital file transfer.
 - 2. Improper or Frivolous RFI's
 - a. Notification of Processing Fee(s).
 - b. Unanswered RFI's will be returned with a stamp or notation: "Not Reviewed."
- B. Architect may opt to retain RFI's for discussion during regularly scheduled project meetings for inclusion of responses in meeting minutes in lieu of responding on a written form.

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

1.01 SCHEDULE OF VALUES

- A. With first Application for Payment, submit three (3) copies of completed AIA Document G703 Continuation Sheet indicating the scheduled value of major categories and subcontracts for the Work, for approval of the Architect.
- B. For each item, provide a column for listing:
 - 1. Item number
 - 2. Description of Work
 - 3. Scheduled Value
 - 4. Previous Applications
 - 5. Work in Place and Stored Materials under this Application
 - 6. Authorized Change Orders
 - 7. Total Completed and Stored to Date of Application
 - 8. Percentage of Completion
 - 9. Balance to Finish
 - 10. Retainage.

1.02 PAY REQUEST

- A. The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by approved AIA Document G703, Continuation Sheet. A minimum of three (3) original copies of these forms shall be submitted for each application. Submit additional copies if requested by the Owner or Architect.
 - 1. Present required information in typewritten form or on electronic media printout.
 - 2. Execute certification by signature of authorized officer.
 - 3. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
 - 4. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.
- B. With each Application for Payment submit lien releases for the previous payment, substantiation for stored materials, monthly progress reports and updates, and any other pertinent items required by the Owner or Architect and identified during the Pre-Construction Conference.
 - 1. AIA Documents G706, Contractor's Affidavit of Payment of Debts and Claims, G706-A, Contractor's Affidavit of Release of Liens, Documents G707, Consent of Surety Company to Final Payment shall be used.
 - 2. If appropriate, G707-A, Consent of Surety to Reduction in or Partial Release of Retainage shall be used.
- C. When acceptable to the Owner, the Contractor may submit for payment on properly stored materials not yet incorporated into the work. Materials stored on the site must be in a secured area and be protected from damage, weather, theft or vandalism. The Contractor shall be responsible for replacing any damaged or missing materials.
- D. Materials stored off the job site must be in the supplier's storage area, separated from other materials, and clearly labeled for this particular project. Insurance certificates for the material naming the Owner as an additional insured, loss payee shall be delivered with the pay request.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 PRECONSTRUCTION CONFERENCE

- A. A Preconstruction Conference to discuss the Project work will be held at a time and location designated by the Architect.
- B. Contractor, and representatives of major Subcontractors, shall meet with Owner and Architect. The purpose of this conference is to discuss the Project in detail, including scheduling of Work, and to answer questions. Unless followed up in writing, verbal authorizations or acknowledgement of those present are not binding.
- C. Meeting minutes will be taken by the Contractor for distribution to all attendees within 48 hours of conference.

1.02 PROGRESS MEETINGS

- A. At day and time designated by Architect, weekly Progress Meeting will be held at Project site.
- B. Contractor and representatives of major Subcontractors shall meet with Owner and Architect.
- C. Contractor is responsible for notifying Subcontractors of their required attendance. These meetings will address progress of the Work and problems that may have developed since the previous meeting.
- D. Unless followed up in writing, verbal authorizations or acknowledgements by those present are not binding.
- E. Meeting minutes will be taken by the Contractor for distribution to all attendees within 48 hours of each meeting.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 CONSTRUCTION SCHEDULE

- A. Submit 3 copies of the Construction Schedule, broken down by Trade or Material, to the Architect for approval prior to the first Pay Request. Schedule shall be by CPM or bar graph type, and shall show proposed starting and completion dates for each Trade and activity for the Work. Submit 3 copies of updated schedule at each Pay Request field review to the Architect.
- B. Submit completed construction schedule to Architect no later than 15 calendar days after date of Agreement and update monthly during construction. Submit current schedule with each application for payment.
- C. Submit completed material delivery schedule to the Architect no later than 20 calendar days after the date of the Agreement. Identify material critical to the progress of the Project and those for which long lead time in procurement is anticipated. Indicate projected dates for submittal, order and delivery of such material.

1.02 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Submit the completed schedule of submittals to the Architect no later than 15 calendar days after date of Agreement and update monthly during construction. Submit current schedule with each application for payment.
- B. Shop Drawings:
 - 1. Following Contractor's review and approval, submit to the Architect three black on white prints of each Drawing for review.
 - 2. The Architect will review the Drawings and affix a stamp to the indicating the findings of the review, and will return same to the Contractor.
 - 3. Comments, if any, will be noted directly on the drawing.
 - 4. The Contractor shall then print and distribute the appropriate number of copies to the various Trades and to Contractor's job personnel as required.
 - 5. If a drawing is indicated to be corrected and resubmitted, correct and resubmit as outlined above.
 - 6. Fire Alarm System/Fire Sprinklers System Shop Drawings shall be submitted to the state and local Fire Marshal and obtain approval prior to installation. Fire Marshal inspection, test and approval of completed installations shall be obtained prior to acceptance of the systems and Substantial Completion of the Project.
- C. Product Data:
 - 1. Following Contractor's review and approval, submit to the Architect four (4) copies of Manufacturer's catalogs and brochures, or PDF format electronic copy of Manufacturer's catalogs and brochures as required by the Specifications. If electronic copy product data are furnished, all files shall be full size PDF only. Resubmit corrected copies for approval in accordance with original submittal.
- D. Samples:
 - 1. Following Contractor's review and approval, submit to the Architect samples of materials in quantities and sizes as required by the Specifications. No electronic copy of samples will be considered for review.

2. Submit a minimum of four (4) samples of each required material, one each for Architect, Owner, Contractor and Subcontractor.
 3. Submittals required other than for selection of color, texture, fabric or finish shall be given to the Architect at a time determined by the Contractor, which will allow for resubmittal and which will not cause and delay in the Work.
 4. Corrected samples shall be resubmitted for approval as per the original submittal.
- E. Color Selection: Within 30 days of the date of Agreement, submit to the Architect for approval, samples and appropriate information required for the selection of colors, textures, fabric and finishes for the entire Project. Physical samples shall be submitted for color or material selections. Electronic samples will not be reviewed. Final selection of color, textures, fabrics or finishes will not be made until all applicable and related submittals have been provided. If the Contractor fails to provide the required samples and related information within the time period, the Architect shall have the option of selecting colors, textures, fabric, finishes or specific materials from those specified or approved and the Contractor shall be obligated to provide the material selected by the Architect.
- F. Submit Shop Drawings, Product Data and Samples for only those items specifically mentioned in the Specifications and or Addenda. Contractor shall be responsible for obtaining Shop Drawings required for the progress of the Work, even though such Shop Drawings may not require the Architect's review.
- G. Partial Submittals: Submittals which are partial or contain only a portion of the data required to describe the item or installation will be rejected, unless such partial submittal is coordinated with the Architect prior to submittal, and final approval of all such items will be withheld pending receipt of all required information.
- H. Deviations: All deviations from the Contract Documents shall be clearly identified in the submittal. Submittal shall include only items included in the specifications or which have been approved in advance by the Architect in accordance with requirements of Section 01600. Submittals containing items which have not been approved in advance by the Architect will be rejected.

1.03 QUALITY CONTROL SUBMITTALS

- A. Equipment Lists: Following Contractor's review and approval, submit to the Architect 6 complete lists of major items of mechanical, plumbing and electrical equipment and materials, within 30 calendar days after date of Agreement. Submit all items at one time. Partial list will not be acceptable. Submittals shall include the Manufacturer's Specifications, weights, space requirements, physical dimensions, rating of equipment and supplemental information requested by the Architect. Submit performance curves for pumps and fans. Where a submittal sheet describes items in addition to that item being submitted, delete such items. Clearly note equipment and materials which deviate from those shown or specified in size, weight, required clearances, and location of access. Modifications to the Work as shown or specified in submittals shall be indicated and shall be provided by the Contractor as a part of the Work.
- B. Manufacturer's Instructions: Where Specifications require Work to be furnished, installed or performed in accordance with a specified product Manufacturer's instructions, distribute copies of such instructions to concerned parties.

1.04 REVIEW PROCESS

- A. All Shop Drawings will be reviewed and returned within 7 working days to the Contractor for distribution to the applicable trades. Shop Drawings for major components of the Work (i.e. Structural Steel) shall be returned within 14 working days.
- B. Shop Drawings are to be submitted to the Architect in a reasonable sequenced manner as not to overburden the reviewing discipline. If the Architect feels as though the review of the Submittal is not on the critical path of the Project, then the review may exceed indicated review times.
- C. If the corrections identified on the Shop Drawings are not corrected and the review of the same Submittal exceeds two (2) reviews, the Contractor will be billed for additional reviews at the current hourly rate charged by the Architect or his Consultants. This process will require that the Contractor be notified of the charges and an additional Service Work Order be signed prior to the review commencing.

END OF SECTION

SECTION 01 42 00

REFERENCES

1.01 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes. Such Reference Standards are made part of the Contract Documents by reference.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. Obtain copies of standards when required by Contract Documents.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.02 SCHEDULE OF REFERENCES

- A. The following is a partial list of agencies, councils, institutions, associations, and so forth that may be referred to in the Contract Documents. This list is not to be interpreted as being complete.

AA	Aluminum Association	www.aluminum.org
AABC	Associated Air Balance Council	www.aabchq.com
AAMA	American Architectural Manufacturers Association	www.aamanet.org
AASHTO	American Association of State Highway	www.aashto.org
ACI	American Concrete Institute	www.aci-int.org
ADC	Air Diffusion Council	www.flexibleduct.org
AFPA	American Forest and Paper Association	www.afandpa.org
AI	Asphalt Institute	www.asphaltinstitute.org
AIA	American Institute of Architects	www.aia.org
AISC	American Institute of Steel Construction	www.aisc.org
AISI	American Iron and Steel Institute	www.steel.org
AITC	American Institute of Timber Construction	www.aitc-glulam.org
AMCA	Air Movement and Control Association	www.amca.org
AMG	Arizona Masonry Guild	www.masonryforlife.com
ANSI	American National Standards Institute	www.ansi.org

APA	Engineered Wood Association	www.apawood.org
API	American Petroleum Institute	www.api.org
ARI	Air-Conditioning and Refrigeration Institute	www.ari.org
ASHRAE	American Society of Heating, Refrigerating	www.ashrae.org
ASME	American Society of Mechanical Engineers	www.asme.org
ASTM	American Society for Testing and Materials	www.astm.org
AWI	Architectural Woodwork Institute	www.awinet.org
AWPA	American Wood Preservers Association	www.awpa.com
AWS	American Welding Society	www.aws.org
AWWA	American Water Works Association	www.awwa.org
BHMA	Builders Hardware Manufacturer's Association	www.buildershardware.com
BIA	Brick Industry Association	www.brickinfo.org
CDA	Copper Development Association	www.copper.org
CISCA	Ceilings and Interior Systems Construction Association	www.cisca.org
CLFMI	Chain Link Fence Manufacturers Institute	www.chainlinkinfo.org
CRI	The Carpet and Rug Institute	www.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute	www.crsi.org
CSSB	Cedar Shingle and Shake Bureau	www.cedarbureau.org
DHI	Door and Hardware Institute	www.dhi.org
EJMA	Expansion Joint Manufacturers Association	www.ejma.org
FMG	FM Global	www.allendale.com
GA	Gypsum Association	www.gypsum.org
GANA	Glass Association of North America	www.glasswebsite.com
ICC	International Code Council	http://www.iccsafe.org/
IEEE	Institute of Electrical and Electronics Engineers	www.ieee.org
IGMA	Insulating Glass Manufacturers Alliance	www.igmaonline.org
MAG	Maricopa Association of Governments	www.mag.maricopa.gov
MBMA	Metal Building Manufacturer's Association	www.mbma.com

MIL	Military Specification	http://dodssp.daps.dla.mil/
ML/SFA	Metal Lath/Steel Framing Association	www.naamm.org
NAAMM	National Association of Architectural	www.naamm.org
NCMA	National Concrete Masonry Association	www.ncma.org
NEBB	National Environmental Balancing Bureau	www.nebb.org
NEMA	National Electrical Manufacturers Association	www.nema.org
NFPA	National Fire Protection Association	www.nfpa.org
NRCA	National Roofing Contractors Association	www.nrca.net
NTMA	National Terrazzo and Mosaic Association	www.ntma.com
PCA	Portland Cement Association	www.cement.org
PCI	Precast/Prestressed Concrete Institute	www.pci.org
PDCA	Painting and Decorating Contractors of America	www.pdca.com
PS	Product Standard U. S. Department of Commerce	http://ts.nist.gov/Standards/Conformity/sccg.cfm
RIS	Redwood Inspection Service	www.redwoodinspection.com
RFCI	Resilient Floor Covering Institute	www.rfci.com
SDI	Steel Deck Institute	www.sdi.org
SDI	Steel Door Institute	www.steeldoor.org
SIGMA	Sealed Insulating Glass Manufacturers Association	Refer to IGMA
SJI	Steel Joist Institute	www.steeljoist.org
SMACNA	Sheet Metal and Air Conditioning	www.smacna.org
SSPC	The Society for Protective Coatings	www.sspc.org
TCA	Tile Council of America, Inc.	www.tileusa.com
UL	Underwriters' Laboratories, Inc.	www.ul.com
WCLIB	West Coast Lumber Inspection Bureau	www.wclib.org
WDMA	Window and Door Manufacturing Association	www.wdma.com
WWPA	Western Wood Products Association	www.wwpa.org

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.01 TESTING LABORATORY SERVICES

- A. Special Inspections and Testing: Owner will employ and pay for the services of an independent testing agency to perform Special Inspections and Testing called for in the Contract Documents and as required by Code or authorities having jurisdiction.
- B. Quality Control Testing and Inspections: Contractor shall retain an independent testing laboratory, acceptable to Architect and Owner, to perform quality control testing Work called for in the Contract Documents, and pay cost of services.
- C. Contractor shall cooperate with Testing Laboratory personnel and provide access to the Work as required to perform testing or inspections called for in the Construction Documents.
- D. Contractor shall furnish samples for such tests and deliver them to the Testing Laboratory in quantities as required by the Contract Documents.
- E. Contractor shall provide Testing Laboratory 24 hours minimum notice in advance of Work being performed that requires testing and/or inspection services.
- F. The Testing Laboratory(s) shall, within 24 hours of performing a test or inspection, distribute digital copies of reports as follows:
 - 1. Architect
 - 2. Structural Engineer or other Engineering Consultant
 - 3. Contractor
 - 4. Owner
 - 5. Code authorities or authorities having jurisdiction as they may require.
- G. All costs for additional inspections and/or retesting required when initial testing indicates Work does not comply with Contract Documents, shall be paid for by the Contractor.
- H. Refer to individual specification Sections and General Notes on Drawings for specific requirements for Testing and/or Inspections. The following lists are intended as a guide to the Contractor to aid in determining testing requirements for the Project, however, the requirements specified in the Technical Sections shall take precedence over these lists and these lists are not to be interpreted as being complete.
 - 1. Special Inspections and Testing:
 - a. Special Inspections and Testing required by the General Structural Notes on the Drawings.
 - b. 03 30 00 - Cast-In-Place Concrete: Test cylinders, slump test(s)
 - c. 04 05 15 - Mortar and Masonry Grout: Test of grout mix
 - d. 04 22 00 - Concrete Unit Masonry: Prism testing
 - 2. Quality Control Testing and Inspections:
 - a. 03 30 00 - Cast-In-Place Concrete: Floor flatness, calcium chloride moisture testing.
 - b. 04 22 00 - Concrete Unit Masonry: Water penetration and leakage
 - c. 07 92 00 - Joint Sealers: Field adhesion testing and stain testing.
 - d. Division 09 Flooring Sections: Moisture content of concrete sub-floors.

1.02 CONTRACTOR'S QUALITY CONTROL

- A. Where Contract Documents require that a particular product be installed and/or applied by an applicator approved by the Manufacturer, it is the Contractor's responsibility to ensure that the subcontractor employed for such work is approved in writing by the Manufacturer of the product. Such subcontractor(s) shall provide evidence of being approved to the Owner and Architect prior to being awarded the Subcontract for the Work.
- B. Work shall be executed by persons skilled in the work required and shall conform to the highest methods, standards and accepted practices of the Trade or Trades involved.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 GENERAL

- A. Comply with codes and regulations regarding potable drinking water, sanitation, dust control, fire protection, and other temporary controls.
- B. Remove temporary office facilities, toilets, storage sheds and other construction of temporary nature from the site as soon as, in the opinion of the Architect, the progress of the work will permit. Recondition and restore to a condition acceptable to the Architect, areas of the site occupied by temporary facilities.
- C. Obtain written approval from the Owner a minimum of 72 hours prior to disconnection or shutting off service or utility.

1.02 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from Utility and make arrangements for such service.
 - 1. Provide temporary electric feeder from electrical service at location as directed by the Utility Owner or as otherwise indicated on Drawings.
 - 2. Where connection to existing utility services is not available, provide temporary electrical generators with appropriate distribution as necessary for construction operations.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as necessary.
- C. Provide main service disconnect and overcurrent protection at convenient location.
- D. Provide adequate distribution equipment, wiring, and outlets to provide branch circuits for power and lighting.

1.03 TEMPORARY LIGHTING

- A. Provide incandescent lighting for construction operations to achieve a minimum lighting level of 2 watts/sq. ft.
- B. Provide adequate floodlights, clusters and spot illumination to work areas after dark.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.
- E. Replace all lamps used during the construction period immediately prior to issuance of Certificate of Substantial Completion.

1.04 TEMPORARY HEATING/COOLING AND VENTILATING

- A. Provide and pay for heating/cooling devices and heat as required to maintain appropriate and specified conditions for construction operations. Exercise measures to conserve energy.
- B. Maintain minimum/maximum ambient temperature and humidity conditions required by individual specification sections for installation of materials and finishes required to have specific environmental conditions.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.05 COMMUNICATIONS

- A. At time of Project mobilization, or before, provide Architect and Owner with Project team directory, including the following:
 - 1. General Contractor's home office.
 - 2. Contractor's superintendant mobile telephone number.
 - 3. Other major subcontractors and Project Team members.
- B. Provide superintendant with mobile telephone throughout construction period.
- C. Computer and Internet Access: Provide computer with internet access in field office.
 - 1. Provide DSL or Cable modem access with 1.5 Mbps minimum.
 - 2. Computer shall be made available to Owner and Architect for use throughout construction.
 - 3. Provide account/address reserved for project use.

1.06 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations.
- B. Extend branch piping throughout the site to provide outlets for hoses with threaded connections.

1.07 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures.

1.08 TEMPORARY FIRE PROTECTION

- A. Provide adequate number of fire extinguishers to protect the Work.
- B. Comply with fire insurance and governing regulations.
- C. Provide UL labeled ABC all-purpose fire extinguishers adequate in size and number.
- D. Provide temporary office and storage areas with fire extinguishers.

1.09 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

- B. Provide protection for plant life designated to remain. Replace damaged plant life.
- C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.10 FENCING

- A. Construction: Commercial grade chain link fence with adequate support to remain in place during storm winds.
- B. Where necessary to prevent access to construction areas, and as required by Contractors own use for staging, provide 6'-0" high fence around areas of new construction as necessary to protect Work; equip with vehicular and pedestrian gates with locks.
- C. Locate gates for access to work areas, as required. Close and lock after working hours.

1.11 ENVIRONMENT PROTECTION AND CONTROLS

- A. Exercise controls to keep noise and dust during construction to a minimum. Traffic or construction areas shall be sprinkled with water or chemicals as required and in accordance with applicable regulatory requirements.
- B. Environmental Protection: Conduct construction operations and operate equipment and machinery using methods complying with environmental regulations to avoid or minimize pollution or contamination to air, water, waterways, soil, groundwater, or other natural resources.
 - 1. Air Resources: Prevent creation of dust, air pollution, and odors.
 - 2. Store volatile liquids, including fuels and solvents, in closed containers.
 - 3. Properly maintain equipment to reduce gaseous pollutant emissions.
 - 4. Properly dispose of hazardous or contaminated debris in compliance with environmental regulations.
 - 5. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment as may be necessary.
 - 6. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
 - 7. Comply with County and City requirements for storm water pollution prevention.

1.12 EXTERIOR ENCLOSURES

- A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.13 PROTECTION OF INSTALLED WORK

- A. Protect all installed work. Provide the special protection features where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to avoid damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Prohibit traffic or storage directly on waterproofed or roofed surfaces.

- E. Prohibit traffic from adjacent native desert and any new landscaped or improvement areas, including trails.

1.14 SECURITY

- A. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism or theft.
- B. Provide and pay for watchman service or 24 hour monitored electronic surveillance system if necessary for adequate protection.

1.15 SITE ACCESS, PARKING AND STAGING

- A. Provide temporary surface parking areas to accommodate construction personnel at locations within contract limit lines indicated or as otherwise directed by Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering paved streets.
- D. Provide fenced area with secure locking gates for exterior construction staging that may be necessary throughout the construction period.

1.16 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition on a daily basis.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Regularly remove waste materials, debris, and rubbish from site and dispose off-site. Do not allow to accumulate.

1.17 PROJECT IDENTIFICATION

- A. General Contractor is limited to one (1) sign located on their construction trailer. Additional signage must be approved by Owner's Representative. Subcontractors, suppliers, manufacturers, consultants, etc., shall not furnish company information banners unless approved by Owner's Representative.
- B. Project Information Sign: Provide 8 foot wide x 4 foot high project sign of exterior grade plywood and wood frame construction, painted to Architect's design and colors.
 - 1. List title of Project, Names of Owner, Architect, and General Contractor.
 - 2. Erect on site at location established by Architect and Owner.
 - 3. Allow 7 working days for Architect to provide electronic graphic image.
- C. Contractor shall obtain all required City approvals and sign permits and pay all fees required for installation of temporary construction signs.
- D. No other signs are allowed without Owner's permission except those required by law.

1.18 FIELD OFFICES AND SHEDS

- A. Office: Weather-tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
- B. Provide space for project meetings, with table and chairs to accommodate the entire Project Team.
- C. Locate offices and sheds as approved by Owner.

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 DELIVERY, STORAGE AND HANDLING

- A. Deliver manufactured materials in original packages, containers or bundles, with the seals unbroken, identified by the name and mark of the Manufacturer, the product name, color, number, and so forth.
- B. Deliver fabrications in as large assemblies as practicable. Fabrications specified to be shop-primed or shop-finished shall be packaged or crated as required to preserve such priming or finish intact and free from damage.
- C. The Contractor shall be responsible for protecting all materials and equipment furnished under the Contract including materials and equipment furnished by the Owner for the Contractor to install and for the materials and equipment furnished and installed by the Owner's separate contractors in the completed or partially completed Work.
- D. Store materials in a manner to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt or other cause will not be acceptable and are to be removed from the site. Replace such materials immediately so as not to delay the Work.
- E. Store materials so as to cause no obstructions. Store off sidewalks, roadways, and underground services.
- F. When a room in the Project is used as a shop or store room, the Contractor shall be responsible for all repairs, patching or cleaning necessary due to such use. Location of such storage space shall be subject to approval of the Architect.

1.02 SUBSTITUTIONS AND PRODUCT OPTIONS

- A. Whenever a product is specified by using a proprietary name or the name of a particular Manufacturer or Vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality desired.
- B. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Architect to determine that products proposed are equivalent to those named.
- C. Prior Approvals:
 - 1. Substitutions will be considered when written request has been submitted to the Architect for approval.
 - 2. Contractor shall request approval of such substitution, in writing, to the Architect using Document 00 43 25 – Substitution Request (During the Bidding Phase) form contained in the Project Manual.
 - 3. Each such request shall include all information requested below for Requests for approval after award of a Contract. If the Owner approves any proposed substitution, such approval shall be set forth in an Addendum.

- D. Requests for approval after award of a Contract:
1. Requests shall be made only under one of the following conditions:
 - a. Specified product or material is not available.
 - b. Extensive revisions to the Contract Documents are not required.
 - c. Proposed changes are consistent with intent of the Contract Documents.
 - d. Request is timely and properly submitted.
 - e. Specified product or material cannot be provided within the Contract Time.
 - f. Request relates to an “or equal” clause.
 - g. Proposed substitution offers Owner a substantial advantage in cost, time, or other considerations.
 - h. Specified product or material cannot receive regulatory approval.
 - i. Specified product or material is incompatible with other materials.
 - j. Specified product or material cannot be coordinated with other materials.
 - k. Specified product or material manufacturer cannot provide the specified warranty.
 2. Requests shall be submitted to the Architect a minimum of 10 working days prior to date Contractor is required to place an order for the product.
 3. Contractor shall request approval of such substitution, in writing, to the Architect using Section 00 63 25 – Substitution Request (After the Bidding Phase) form contained in the Project Manual.
 4. The request shall specifically state the reason that the product is unavailable with evidence to substantiate the reason.
 5. Requests made directly to Architect by suppliers, subcontractors and distributors that are not from the Contractor will not be accepted by the Architect or Owner.
 6. Architect will approve or reject substitution in writing.
 7. Substitutions will not be considered if they are indicated or implied on Shop Drawings.
- E. Contractor shall submit descriptive brochures, drawings, samples and other data as is necessary to provide direct comparison to the specified materials after reviewing and determining that product meets specified requirements. Submittals shall be well marked and identified as to types and kind of the items being submitted for approval. Lack of sufficient information will be cause for rejection. Reference to catalogs will not be acceptable unless catalog is submitted with approval request and the specific product or material and its components are clearly identified.
- F. In submitting a substitution, the Contractor makes the following representations:
1. Proposed substitution has been fully investigated and determined to be equal or superior to specified product or material.
 2. The same warranty will be furnished for proposed substitution as for specified product or material.
 3. The same maintenance service and source of replacement parts, as applicable, is available.
 4. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
 5. Cost data included on the substitution request is complete. Claims for additional costs related to accepted substitution and its impact on other portions of the Work which may subsequently become apparent are waived.
 6. Proposed substitution does not affect dimensions and functional clearances.

7. Payment for costs for additional services of Architect caused by the substitution shall be paid by Contractor. The Contractor will be billed for additional services at the current hourly rate charged by the Architect. The Architect will charge the Owner, and such costs will be deducted from monies still due the Contractor.
8. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

END OF SECTION

SECTION 01 73 00

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 EXAMINATION AND COORDINATION OF WORK

- A. Verification of Conditions: Examine and verify surfaces, subsurfaces, condition and serviceability of previous work to receive subsequent work and report detrimental conditions in writing to the Architect.
- B. Commencement of work acknowledges acceptance and serviceability of previous work.
- C. Coordination: Coordinate with other work which affects, connects with, or will be concealed by subsequent work.
 - 1. Work within concealed ceiling and plenum spaces shall be coordinated with all other work within these spaces to assure a coordinated assembly.
 - 2. Coordinate location and layout of mechanical, electrical and other systems located within suspended ceilings.
 - 3. Utilize Revit Model to create fully coordinated model and Shop Drawings of Project infrastructure. Perform clash detection analysis and report conflicts to Architect.
 - 4. Notify Architect immediately if conflicts are found.
 - 5. Adjust work in place in concealed ceiling spaces as required to allow installation of other work which cannot be adjusted.
- D. Any remedial work required to be performed on previously placed work after new work has commenced shall be by and at the expense of the Contractor and/or sub-contractor having commenced the new work.

1.02 TOLERANCES

- A. Certain tolerances are listed in the various specification sections and on the Drawings. In addition, other tolerance limits are set forth below. These tolerances are the maximum variation allowed on the Project.
- B. Each of the Contractors shall review the tolerance limits established for their work as they relate to the other work on the Project. Should the tolerance limits established for their work be in conflict with those limits established for other adjoining work, the Architect and Owner shall be notified before proceeding.
- C. It is the intention of the Contract Documents that, assuming work in place is within the tolerance limits established, or has been accepted by following contractor(s), subsequent work shall be adjusted as required.
- D. Tolerances:
 - 1. Concrete: 1/8 inch plus or minus in any 10 feet and 3/4 inch total overall in any direction.
 - 2. Masonry: 1/8 inch plus or minus in any 10 feet and 1/4 inch total overall in any direction.
 - 3. Structural Steel: 1/8 inch plus or minus in 60 feet and 1/2 inch total overall in any direction.
 - 4. Miscellaneous Metal: 1/8 inch plus or minus in 20 feet and 1/4 inch total overall in any direction.

5. Ornamental Metal: 1/8 inch total overall in any direction.
 6. Drywall: 1/16 inch plus or minus in any 12 feet and 1/8 inch total overall in any direction.
 7. Acoustic Tile: 1/8 inch maximum variation overall in any direction.
 8. Granite and Marble: 1/16 inch maximum variation overall in any direction.
 9. Millwork: 1/16 inch Maximum overall in any direction.
 10. Ceramic Tile: 1/16 inch maximum overall in any direction.
- E. All materials such as Stone tile and veneers, acoustic tile, lay-in acoustical panel and decorative ceilings, ceramic tile, VCT, wood flooring, and so forth, are to meet flush with adjacent pieces of the same material.

1.03 APPROVED APPLICATORS

- A. Where specific instructions in the Specifications require that a particular product and/or material be applied and/or installed by an "approved applicator" it shall be the Contractor's responsibility to insure that any subcontractor or sub-subcontractor used for such Work is in fact currently certified by the particular Manufacturer for this type of installation or application.

1.04 APPROVED MANUFACTURERS

- A. Each Section includes a list of Manufacturers whose equipment is acceptable as to manufacture, subject to conformance with the Contract Documents. Careful checking must be completed by the Contractor and the manufacturer or equipment supplier to verify that the equipment will meet all capacities, requirements, space allocations and is suitable for the intended purpose specified.

1.05 REFERENCE DATA

- A. Reference data made available to the Contractor is for the Contractor's information only, and neither the Owner nor the Architect assume any responsibility for the Contractor's conclusions.
- B. The Contractor shall establish and maintain all building and construction grades, lines, levels, and bench marks. This Work shall be performed by a licensed Civil Engineer or Surveyor under the employ of the Contractor, who shall certify to the Owner that he has performed this service.
- C. The Contractor shall not remove any fixed property line markers, monuments or data.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting, fitting and patching, including attendant excavation and backfill required to complete Work, and for:
 - 1. Making several parts fit together properly.
 - 2. Uncovering portions of Work to provide for installation of ill-timed Work.
 - 3. Removing and replacing defective and non-conforming Work.
 - 4. Removing samples of installed Work required for testing, as directed by Architect.
 - 5. Providing routine penetrations of non-structural surfaces for installation of piping electrical conduit, and similar items.

1.02 SUBMITTALS

- A. In advance of executing any cutting or alterations, submit written request to Architect requesting consent to proceed with cutting which affects:
 - 1. Work of Owner or other trades.
 - 2. Structural value or integrity of any element of Project.
 - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. Efficiency, operational life, maintenance or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.
- B. Include in request:
 - 1. Identification of Project.
 - 2. Description of affected Work.
 - 3. Necessity for cutting, alteration or excavation.
 - 4. Effect of Work of Owner or other trades, or structural or weatherproof integrity of Project.
 - 5. Description of proposed Work:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades which will execute Work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 - 6. Alternatives to cutting and patching.
 - 7. Cost proposal, when applicable.
 - 8. Written permission of trades whose Work will be affected.
- C. Submit written notice to Architect designating time work will be uncovered and when work will be performed to provide for observation when necessary.

1.03 PAYMENT FOR COSTS

- A. Payment caused by ill-timed or defective work or work not conforming to Contract Documents, including costs for additional services of Architect and Engineer shall be paid by Contractor. The Contractor will be billed for additional services at the current hourly rate charged by the Architect. The Architect will charge the Owner, and such costs will be deducted from monies still due the Contractor.

- B. Payment of work done on written instructions of Architect, other than defective or nonconforming work, will be paid by Owner on approval of a written Change Order. Provide written cost proposal prior to proceeding with cutting and patching instructed by Architect for other than defective or nonconforming work. All work shall be approved by Architect and Owner prior to commencement.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide for replacement of Work removed. Comply with Contract Documents for type of Work standards and Specification requirements for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching, and excavating and backfilling. After uncovering Work, inspect conditions affecting installation of new products and verify procedures with Architect.
- B. Report unsatisfactory or questionable conditions in writing to Architect/Engineer. Do not proceed with Work until further instructions are received.

3.02 PREPARATION

- A. Provide shoring, bracing and supports as necessary to maintain structural integrity of work. Design of shoring, bracing and supports shall be performed by an Engineer registered in the State of Arizona.
- B. Provide devices and methods to protect other portions of Work from damage, including elements which may be exposed by cutting and patching Work. Maintain excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION

- A. Performance:
 - 1. Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - 2. Execute cutting and demolition by methods which prevent damage to other Work to provide proper surfaces to receive installation of repairs and new Work.
 - 3. Execute excavating and backfilling by methods which prevent damage to other Work and settlement as specified in Section 31 01 00.
- B. Employ original installer or fabricator to perform cutting and patching for:
 - 1. Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants and waterproofing.
 - 2. Sight-exposed finished surfaces.
- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes as shown on Drawings and as specified.

- D. Fit Work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces. Conform to fire code requirements for penetrations and maintain integrity of fire walls and ceilings.
- E. Restore Work which has been cut or removed. Install new products to provide completed Work in accordance with requirements of Contract Documents and as required to match surrounding areas and surfaces.
- F. Refinish entire surfaces as necessary to provide an even, matching finish as follows:
 - 1. Painted Walls or Ceilings: To nearest intersection with another finish or corner.
 - 2. Where applied finishes occur (i.e wallcovering, tile, wood paneling): To nearest intersection of finish without damage to adjacent material. Where match of pattern, grain, texture, or similar finish cannot be made, refinish area to intersection with other finish or internal corner.
 - 3. Manufactured or shop fabricated materials: Replace entire affected surface or entire component.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 FINAL CLEANING

- A. Perform the following special cleaning for trades at completion of Work. Employ experienced workmen or professional cleaners for the final cleaning:
 - 1. Remove marks, stains, fingerprints, soil and dirt from paint, stain and wall covering.
 - 2. Remove spots, soil, paint and mastic from tile work and wash same.
 - 3. Clean fixtures, equipment and piping; remove stains, paint, dirt and dust.
 - 4. Remove temporary floor protections; clean and polish floors.
 - 5. Clean concrete walks and slabs of plaster or cement droppings, paint and other objectionable materials to present a neat, clean appearance.
 - 6. Clean exterior and interior metal surfaces, including doors and windows and their frames.
 - 7. Remove oil, stains, dust, dirt, paint and the like from items required to have a polished finish; polish and leave without fingermarks or other blemishes.
 - 8. Wash interior and exterior glazing, inside and outside.
 - 9. Polish mirrors.
- B. Make building(s) ready for occupancy in every respect. Lay heavy building paper in main circulation areas to protect the floors until final inspection and acceptance.
- C. Existing improvements, inside or outside the property which are disturbed, damaged or destroyed by the Work under the Contract shall be restored to their original condition unless as part of the Work, improvements were required.

1.02 PROJECT RECORD DOCUMENTS

- A. As the work progresses, the Contractor shall maintain a complete and accurate record of changes or deviations from the Contract Documents and Submittals, indicating the Work as actually installed. Document information by daily corrections and/or additions in the appropriate locations on a record set of prints of the Construction Documents and Submittals and a copy of the Specifications which shall be maintained by the Contractor solely for the purpose of this documentation. Keep this record set of Construction Documents and Submittals at the Project site for review by the Owner and Architect.
- B. Information contained in the Record Documents shall include, but not be limited to:
 - 1. Modifications made by Addenda, Bulletins, Change Orders, Construction Change Directives and Architect's Supplemental Instructions.
 - 2. Location of site underground pipes, conduits, ducts, cables and similar work, dimensioned horizontally to permanent points of reference and located vertically by indicating depth of burial and invert elevations. Dimensions shall be accurate within 2 inches.
 - 3. Location of building plumbing piping, sprinkler piping, control valves, shut-off valves, heating and air conditioning equipment, mechanical piping, ductwork, major conduit runs, power, control and alarm wiring, etc., dimensioned horizontally to permanent points of reference. Dimensions shall be accurate within 2 inches. By notation, describe the vertical location of the item such as "below slab," "above ceiling," etc.
 - 4. Modifications made to accommodate field conditions.

5. Location and function of mechanical and electrical control devices and shut-off valves.
 6. Panel schedules showing final circuiting of electrical fixtures and equipment.
- B. The Architect will provide the Contractor with a black-line bond paper set of drawings, of the complete original bidding documents, at Contractor's expense. Seals and signatures of Registrants shall be completely removed and/or permanently obscured. Contractor shall provide the following on the Drawings:
1. Changes in the Contract Documents, secured with prior approval of the Architect, recorded in a neat readable manner, in black ink, by a competent drafter. Deletions shall be made by erasure or other indication clearly indicating information deleted. Record information in adequate size lettering and notations to be legible at half size reproduction.
 2. Prior to application for final payment, transfer all changes, information and notations made to the record prints to the reproducible set.
- C. Upon Substantial Completion of the Work, deliver the complete set of Record Documents including prints, black-line bond paper set, Shop Drawings and annotated Specifications to the Architect for approval.
- D. Permit Record Set, as approved by all governing agencies shall be kept in secure location by the Contractor.

1.03 OWNERS MANUAL

- A. Owner's Manual: Prior to final payment, provide 1 digital copy and Three (3) hard-back, loose-leaf binders, suitably typed, indexed and labeled, containing the following:
1. Subcontractors and major suppliers list with companies names, addresses, email addresses and telephone numbers.
 2. Warranties and certifications.
 3. Affidavit from general and subcontractors on use of asbestos free materials.
 4. Maintenance/operation instructions.
 5. Parts list.
 6. List of Extra Materials delivered to Owner; signed for by Owner's representative.
 7. Other items required by the Specifications.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submittals: Submit two (2) draft copies of Operation and Maintenance Manuals for systems and equipment, including electrical and control items, and parts lists, a minimum of 14 days prior to requesting inspection for Substantial Completion, or scheduled Substantial Completion Date, whichever is earlier. Furnish separate copies for each Division.
1. Architect will review Manuals for general scope and content and return one copy of draft manuals with required action.
- B. Operating instructions shall include complete operating sequence, control diagrams, description of method of operating machinery, machine serial numbers, factory order numbers, parts, tests, instruction books, suppliers phone numbers, addresses, email addresses, and individual equipment guarantees. Parts lists shall be complete in every respect, showing parts and part numbers for ready reference.

- C. Maintenance instructions shall include a written list of required and suggested maintenance for mechanical, plumbing, electrical or other equipment or features in the project. Each item shall contain a brief description of the maintenance required as well as the recommended time frame or period for the maintenance. Include lists of filter sizes for air handling equipment, indicated "washable" or "disposable" and for which unit the filter is for.
- D. Provide operating and maintenance instructions on DVD, memory key or similar electronic media, either prepared by the Contractor or where available, manufacturers prepared operations and maintenance videos and/or instructions for each specific equipment item or system.
- E. Assemble maintenance manual and operating instructions in hard back loose leaf binders. Suitably label and index material for ready reference.
- F. Upon substantial completion of the Project Work, submit one copy of the Operation and Maintenance Manual and Parts Lists to the Architect for approval. Upon receipt of Notice of Approval, deliver the additional copy to the Owner. Include CD and/or DVD disks of materials in electronic format.

1.05 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Deliver spare parts, tools, extra stocks of material and similar physical items required by individual specification sections to the Owner with a copy of the transmittal to the Architect. Obtain signed receipts from the Owner for all items.
- B. Change over construction locks to permanent keying system. Deliver required number of keys to the Owner with a copy of the transmittal to the Architect. Obtain receipts from the Owner for delivered items.

1.06 ELECTRONIC COPIES OF IMAGE DOCUMENTS

- A. Upon completion provide CD, DVD, or memory key containing image copies in JPEG, PDF or other appropriate electronic format of all record and maintenance documents.

1.07 WARRANTIES

- A. Submit warranties required by individual specification Sections in duplicate, assembled in durable binders with a Table of Contents and a digital copy of same on DVD, memory key or other current electronic media.
- B. The date of commencement of warranties shall be the date of Substantial Completion except as may be modified by AIA Document G-704, Certificate of Substantial Completion, or by other written agreement with the Owner.

END OF SECTION

SECTION 03 05 05

FLY ASH

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Fly ash admixture for incorporation into concrete mixes specified in the following specification sections:
1. Section 03 30 00 - Cast-In Place Concrete.
 2. Section 04 05 15 - Mortar and Masonry Grout.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Coal Fly Ash and Raw or Calcined Natural Pozzolan
1. Sampled and tested in accordance with the current edition of ASTM C 311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
 2. Conform to the requirements of the current edition of ASTM C 618, Standard Specification of Coal Fly Ash and Raw and Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete, as follows:
 - a. Meet the requirements of ASTM C 618, Table 1 Chemical Requirements and Table 1A Supplementary Optional Chemical Requirements.
 - b. Meet the requirements of ASTM C 618, Table 2 Physical Requirements and Table 2A Supplementary Optional Physical Requirements in the following areas:
 - 1) Effectiveness in Controlling Alkali-Silica Reaction.
 - 2) Effectiveness in Contributing to Sulfate Resistance, Procedure A.
 - 3) Uniformity Requirements when air-entraining concrete is specified:
 3. Source Quality Control:
 - a. Fly ash shall come from sources with an established quality control program to demonstrate that the fly ash consistently conforms to ASTM C 618 specification and uniformity requirements. The quality history shall include a minimum of 40 test results representing a minimum of the previous 6 months production of fly ash.
 - b. Per the current edition of ACI 232, Use of Fly Ash in Concrete, section 5.6, the fly ash quality history shall be available that demonstrates at least monthly ASTM C 618 certification results from a Cement and Concrete Reference Laboratory (CCRL) accredited laboratory. A minimum of 20 reports representing at least 6 months of fly ash production is required.

2.02 MIXES

- A. Provide fly ash admixture for incorporation into concrete mixes as specified in the following specification sections:
1. Section 03 30 00 - Cast-In Place Concrete.
 2. Section 04 05 15 - Mortar and Masonry Grout.

- B. Proportioning:
1. Per ACI 232, Use of Fly Ash in Concrete, section 4.1, the most effective method for proper proportioning of concrete for a specific application is by use of a trial batch and testing program per ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete. When necessary, a series of mixtures shall be prepared and tested to determine the proper proportions for the specific project requirements.
 2. Fly ash shall when used shall not replace more than 18 percent of cementitious materials and shall have a replacement factor of 1.2 relative to cement replaced.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Formwork for cast-in-place concrete, including, but not limited to:
 - 1. Shoring, Bracing and Anchorage, including openings for other Work
 - 2. Form Accessories
 - 3. Form Stripping.

1.02 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347R - Guide to Formwork for Concrete.

1.04 QUALIFICATIONS

- A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Arizona.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site to prevent deterioration and damage.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.06 COORDINATION

- A. Coordinate this Section with other Sections of Work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Architect's Structural Engineer before proceeding.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Concealed Concrete: Plywood, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit. For use in below grade concrete or concrete covered by another finish. Not for use where finished concrete is exposed to view.
 - 1. Plywood, Douglas Fir species; APA grade-trademarked; BB Plyform, Class 1, Exterior Grade as per PS1.

2. Lumber: Spruce, Pine or Fir species; construction grade, with grade stamp clearly visible.
 3. Plywood shall have mill applied release agent and edge seal.
- B. Forms for Exposed Concrete: Plywood, MDO, tempered concrete-form-grade hardboard, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surface. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system where shown on Drawings. For use in exposed to view concrete that is not covered by another finish.
1. MDO (medium density overlay), class 1 or better, with mill applied release agent and edge seal.
 2. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C of B-B High Density Overlaid Concrete Form," Class I.
 3. Tempered concrete-form-grade hardboard, with applied release agent and edge seal.
 4. MDO, plywood, and hardboard forms shall have mill applied release agent and edge seal.
- C. PVC Sleeves: ASTM D1758, PVC 1120 compound, Schedule 40.

2.02 FORMWORK ACCESSORIES

- A. Form Ties: Removable or snap-off type, free of defects that could leave holes larger than one inch in concrete surface.
- B. Form Release Agent: 100 percent biodegradable, zero VOC, vegetable base, colorless, which will not stain concrete, or impair natural bonding or color characteristics of coating intended for use on concrete.
1. Do not use petroleum-based agents. Paraffin and waxes shall not be used when a concrete finish is required.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.02 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Arrange formwork for exposed concrete in an orderly and symmetrical manner to produce smooth concrete finish.
- C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.

- E. Align joints and make watertight. Keep form joints to a minimum.
- F. Obtain approval from Architect before framing openings in structural members which are not indicated on Drawings.
- G. PVC Sleeves: Set PVC sleeves in proper alignment and position. End of sleeves shall be flush with finished concrete surface.

3.03 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with Manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete. Set form materials for reveals where indicated, plumb and level. Ensure forms are secured in place and not disturbed during concrete placement.
- C. Coordinate Work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with Manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.05 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.06 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Construct formwork as required to produce concrete members of size, shape, configuration, alignment, elevation and position indicated on Drawings within tolerance limits of ACI 301.

- C. Surface Irregularities: Construct and maintain formwork to produce concrete having the following formed finish Class and permitted abrupt or gradual irregularities as designated by ACI 347-04.
 - 1. Vertical and horizontal exterior exposed surfaces: Class B, 1/4 inch.
 - 2. Other surfaces prominently exposed to public view: Class B, 1/4 inch.
 - 3. Concealed surfaces where covered by another finish: Class C, 1/2 inch, except abrupt irregularities shall be limited to 1/4 inch.

3.07 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design, and that support, fastenings, wedges, ties and items are secure.
- B. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.08 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Forms shall be removed in accordance with the requirements of the General Structural Notes.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Formwork for stem walls and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage.
- E. Cure exposed concrete in accordance with Section 03 30 00 whenever the formwork is removed during the curing period.

3.09 REMOVAL STRENGTH

- A. When formwork removal is based on the concrete reaching its specified 28 day strength (or a specified percentage thereof), the concrete shall be presumed to have strength when either of the following conditions has been met:
 - 1. When test cylinders, field cured under the most unfavorable conditions prevailing for any portion of the concrete represented, have reached the required strength.
 - 2. When the concrete has been cured for the same length of time as the age, at test, of laboratory cured cylinders which reach the required strength. The length of time concrete has been cured in the field shall be determined by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50 degrees F. and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Concrete reinforcement as shown on the Drawings and as specified.

1.02 QUALITY ASSURANCE

- A. Comply with ACI-301, Chapter 5, except where more exacting requirements are specified.
- B. Comply with requirements in AWS-D12.1, except where more exacting requirements are specified in the Contract Documents.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing bending and placing of reinforcing. Include diagrammatic elevations of walls at a scale sufficiently large to show clearly the position and erection marks of marginal bars and their dowels and splices and bar arrangement for more than one layer of reinforcing steel in concrete sections.
- B. Certificates: Submit certified mill test reports for review prior to fabrication.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Shipping: Deliver reinforcement to the Project site bundled, tagged and marked to facilitate sorting and placing. Tags shall indicate bar sizes, lengths, grade and other information corresponding to markings shown on placement diagrams.
- B. Storage and Protection: Store reinforcement at the site off the ground and in a manner to prevent damage to the materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Reinforcing Steel: New billet-steel, deformed bars conforming to ASTM A615, Grade 60, with a minimum yield of 40 ksi for all bars #3 and smaller and ASTM A615, Grade 60, with a minimum yield of 60 ksi for all bars #4 and larger, unless noted otherwise on Drawings.
- B. Welded Wire Fabric: ASTM A185 using bright steel wire meeting the requirements of ASTM A82. Gauges and dimensions as noted on the Drawings.
- C. Chairs: Galvanized steel or plastic tipped.
- E. Tie Wire: ASTM A82, 16 gauge or heavier, black annealed.

2.02 FABRICATION

- A. Shop fabricate bars as far as is practical. Bend bars cold. Make bends for stirrups and ties around pins having diameters at least 2 times the thickness of the bars; for other bars 1 inch diameter and smaller, 6 times the thickness; for larger bars 8 times the thickness.

PART 3 EXECUTION

3.01 PLACING REINFORCEMENT

- A. General:
 - 1. Place in accordance with ACI 318 and as shown.
 - 2. Accurately place reinforcement and securely tie at intersections with 16 gauge black annealed wire.
 - 3. Maintain reinforcing in proper position by chairs, bar supports or other approved devices.
 - 4. Bars in footings shall be supported on precast concrete blocks.
 - 5. The bending or field cutting of bars around openings or sleeves will not be permitted.
- B. Splices shall be Class B tension splices per ACI 318 unless noted otherwise on Drawings. Stagger a minimum of one lap length. Hook horizontal bars around corners not less than 24 diameters, with a minimum of 12 inches as per typical details. All splice locations are subject to approval by the Structural Engineer.
- C. Concrete protection of reinforcing shall be not less than the following:
 - 1. Concrete is poured against and permanently exposed to ground: 3 inches.
 - 2. Concrete is poured against forms but may be in contact with ground:
 - a. #5 and under: 1-1/2 inches.
 - b. #6 and larger: 2 inches.
- D. Clear distance between bars shall be not less than 1-1/2 times the maximum size of coarse aggregate unless noted otherwise.
- E. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter or enough to exceed code tolerances, resulting arrangement of bars shall be subject to review of Architect.
- F. Bars with kinks or bends not indicated shall not be used. Reinforcement shall not be bent or be straightened in a manner that will weaken the material, or be bent after being partially embedded in hardened concrete.
- G. Wire mesh in slabs: Laps in welded wire fabric shall be made so that the overlap, measured between outermost cross wires of each fabric sheet, is not less than the spacing of cross wires plus 2 inches.

3.03 CLEANING

- A. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of off premises. Leave Work in clean condition.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Cast-in-place concrete including, but not limited to, the following:
 - 1. Footings, foundations and slabs-on-grade for site structures.
- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Formwork
 - 2. Section 03 20 00 – Concrete Reinforcement
 - 3. Section 03 35 33 – Decorative Concrete Finishes, for ground finish concrete.

1.02 SUBMITTALS

- A. Mix Design: Submit mix design for each class of concrete to the Architect for review. Review of mix designs by Architect and/or Engineer shall in no way relieve the Contractor of responsibility for the performance of the concrete.
- B. Product Data: Submit Manufacturer's Specifications and performance data for accessory products.
- C. Shop Drawings: Submit shop drawing showing proposed location of construction joints, expansion/contraction joints and control joints and obtain approval of same from Architect prior to construction.
- D. Samples of materials, including names, sources and descriptions, of the following:
 - 1. Decorative concrete slab finishes as specified herein and in related Sections.

1.03 QUALITY ASSURANCE

- A. Standards:
 - 1. Standard for measuring, mixing, transporting and placing of concrete shall be ACI-301 and ACI-304.
 - 2. Standard for measuring, mixing and delivery of ready mixed shall be ASTM C94, except that time in mixer after water has been added at batch plant is limited to 1-1/2 hours.
 - 3. Job-mixed concrete shall be subject to Architect's review of design, mixing and handling procedures.
- B. Field Samples:
 - 1. Provide on-site sample(s) of each type of exposed flatwork concrete finish showing texture and color before proceeding with finish to be used on this Project.
 - 2. Sample(s) shall be minimum 4'-0" square and have at least one longitudinal and one transverse joint.
 - 3. Construct sample panels in ample time to allow for finishing and curing before requesting Architect to review.

4. Construct where directed by Architect and prepare successive sample panels as required until finish acceptable to Architect is produced.
 5. Since sample panels will constitute a basis of acceptance or rejection of the completed Work, do not remove sample panels until authorized in writing by the Architect. Dispose of sample panels in a legal manner when authorized.
- C. Pre-Installation Conference:
1. Contractor shall conduct a meeting at Project site to review proposed mix designs and discuss required methods and procedures to achieve required concrete construction.
 2. Contractor shall distribute meeting agenda to all attendees a minimum of 7 days prior to the scheduled date meeting.
 3. Attendees: Responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
 - a. Contractor's superintendent.
 - b. Laboratory responsible for concrete design mix.
 - c. Laboratory responsible for field quality control.
 - d. Concrete subcontractor.
 - e. Ready-mix concrete producer.
 - f. Admixture manufacturer(s).
 - g. Concrete placement equipment manufacturer(s).
 4. Meeting minutes will be taken by the Contractor for distribution to all attendees within 5 days of meeting. Contractor shall also distribute copy of meeting minutes to Owner, Structural Engineer, and Architect.
 5. Minutes shall include statement by concrete subcontractor indicating proposed mix design, placement, finishing and curing procedures can produce the concrete quality required by these specifications.
- D. Static Coefficient of Friction: Sealed concrete floors shall have a tested coefficient of friction of 0.71 minimum dry, 0.6 minimum wet for level surfaces and treads of stairs and 0.8 minimum wet or dry for ramp surfaces when tested in accordance with ASTM D2047 / UL410.

1.04 PROJECT CONDITIONS

- A. Rain protection: Do not place concrete during rain unless adequate protection has been provided.
- B. Cold weather protection: Comply with ACI-306R.
- C. Hot weather protection: Comply with ACI-305R and 305.1-06.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type II, alkali content not to exceed 0.6 percent. Use one brand and type of cement throughout Project unless otherwise specified.
- B. Aggregate: Clean, coarse aggregate and gravel, free from foreign matter, conforming to ASTM C33. Aggregate shall be graded from coarse to fine in accordance with ASTM C33, Size 67.

- C. Admixtures:
1. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures. Provide one of the following:
 - a. AEA-92 and Air 40, Euclid Chemical Co. www.euclidchemical.com
 - b. Sika AER, Sika Corp. www.sikaconstruction.com
 - c. Master Builders MB-VR or MB-AE, BASF Admixtures www.basf-admixtures.com
 2. Water-Reducing Admixture: ASTM C494, Type A, and containing not more than 0.05 percent chloride ions. Provide one of the following:
 - a. Eucon NW or Eucon WR 91, Euclid Chemical Co.
 - b. Master Builders Pozzoloth 322N, BASF Admixtures
 - c. Plastocrete 160, Sika Chemical Corp.
 3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or Type G and containing not more than 0.05 percent chloride ions. Provide one of the following:
 - a. Eucon 37/Eucon 1037, or Plastol Series, Euclid Chemical Co.
 - b. Daracem 100 or ADVA Flow, W.R. Grace & Co.
 - c. Master Builders Rheobuild 1000 or Glenium 3030, BASF Admixtures.
 4. High-Range, Water-Reducing, and Retarding (Superplasticizer): ASTM C 494, Type G. Provide one of the following:
 - a. Eucon 537, Euclid Chemical Company
 - b. Daracem 100, W.R. Grace & Co.
 - c. Master Builders Rheobuild 916, BASF Admixtures
 5. Non-Chloride, Non-Corrosive Accelerating Admixture: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Provide one of the following:
 - a. Accelguard 80, 90 or NCA, Euclid Chemical Co.
 6. Water-Reducing, Retarding Admixture: ASTM C494, Type D, and contain not more than 0.05 percent chloride ions. Provide one of the following:
 - a. Eucon NR or Eucon Retarder 100, Euclid Chemical Co.
 - b. Master Builders Pozzoloth Retarder, BASF Admixtures.
 - c. Plastiment, Sika Chemical Co.
 7. Fly ash admixture: In accordance with Section 03 05 05.
 8. Use set-retarding admixtures during hot weather only when approved by Architect.
 9. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

D. Water: Potable.

2.02 ACCESSORIES

- A. Bonding Agents and Repair Products:
1. Interior Only (PVA): L&M Construction Chemicals EVERWELD www.lmcc.com; EucoWeld, Euclid Chemical Company www.euclidchemical.com; US Spec Bondcoat PVA www.usspec.com; or Larsens' Weld Crete www.larsenproducts.com
 2. Interior Only for Bonding Existing Concrete to Fresh Concrete (Epoxy): Sikadur 32, Hi-Mod, Sika www.sikausa.com; Euco 452 Series, Euclid Chemical Company www.euclidchemical.com; Maxi-Bond 2500, US Spec www.usspec.com; or Rezi-Weld, W.R. Meadows www.wrmeadows.com.

3. Exterior and Interior Bonding Admixture (acrylic latex): SBR Latex or Flexcon Euclid Chemical Company www.euclidchemical.com; Intralok, W.R. Meadows www.wrmeadows.com; Acylcoat, US Spec www.usspec.com; or Dayton Bond J40, Dayton Superior www.daytonsuperior.com.
 4. Polymer Repair Compounds: Polymer and microsilica modified cementitious based compounds.
 - a. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - b. Horizontal Locations:
 - 1) Sikatop 121 or 122, Sika Chemical www.sikausa.com
 - 2) Thin Top Supreme, Concrete Top Supreme, Euclid Chemical Company www.euclidchemical.com
 - 3) TP Mortar, US Spec www.usspec.com
 - c. Vertical or Overhead Locations:
 - 1) Sikatop 123, Sika Chemical
 - 2) V/O Patch, US Spec
 - 3) Verticoat, Verticoat Supreme, Concrete Top Supreme, Euclid Chemical Company
 5. Underlayment Topping: Free-flowing, self-leveling, pumpable cementitious base compound.
 - a. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - 1) Ardex K-15, Ardex Inc.
 - 2) Flo-Top or Super Flo-Top, Euclid Chemical Company
 - 3) Self-Leveling Underlayment, US Spec
 - 4) Underlayment 110, BASF
 6. Repair Topping: Latex modified, sandless cementitious mortar topping with bond strength meeting or exceeding requirements of ASTM C1059.
 - a. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - 1) Thin Top Supreme, Euclid Chemical Company
 - 2) TP Mortar, US Spec
 - 3) As approved by Architect.
- B. Non-Shrink Grout:
1. Premixed or prepackaged, non-metallic, non-gaseous, bleed free compound; non-shrink when tested in accordance with ASTM C 1107, Grade B at a fluid (flow cone) consistency of 20 to 30 seconds.
 2. Attain minimum compressive strength of 7,000 psi in 28 days at above fluid consistency.
 3. Fluid grouts: Remain workable, flow through flow cone after 20 minutes with slight agitation, in temperatures from 40 to 70 degrees F.
 - a. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - 1) Suregrip High Performance, Dayton Superior, www.daytonsuperior.com
 - 2) Sikagrout 212, Sika www.sikausa.com
 - 3) Master Builders (Masterflow 713) www.masterbuilders.com
 - 4) W.R. Meadows No. 588 Grout www.wrmeadows.com
 - 5) L&M Construction Chemicals (DURAGROUT) www.lmcc.com
 - 6) US Spec "GP Grout" www.usspec.com
 - 7) Euclid N-S Grout www.euclidchemical.com.

4. High Flow Fluid Grouts: High flow grout shall achieve 95 percent contact when placed under an 18 inch x 36 inch base plate, remain workable, and flow through cone after 60 minutes in temperature from 70 to 90 degrees F.
 - a. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hi-Flo Grout, Euclid Chemical Company www.euclidchemical.com
 - 2) US Spec "MP Grout" www.usspec.com
 - 3) Chemrex Masterflow 928, BASF www.chemrex.com
- C. Epoxy Anchoring Adhesive: 2-component, high modulus, 100 percent solids epoxy gel adhesive complying with ASTM C881.
 1. Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - a. Hilti HIT-RE 500-SD www.hilti.com
 - b. Simpson Strong-Tie Co. Set-XP www.simpsonanchors.com .
- D. Formed Construction Joint: Standard design plastikey, tongue and groove key joint; 3-1/2 inch vertical dimension for 4 inch slabs. For use only in slabs not exposed to vehicular traffic.
- E. Preformed Expansion Joint Filler: ASTM D1751.
- F. Liquid Curing and Sealing Compound:
 1. Verify that specified curing compound is compatible with the floor finish material(s) and adhesive(s) that will be applied to floor surface prior to delivery of curing compound to jobsite. If it is determined that the curing compound is not compatible with the floor finish material(s) and adhesive(s) that will be applied to floor surface, Contractor shall immediately notify Architect.
 2. Dissipating Hydrocarbon Resin Curing Compound: ASTM C309, VOC compliant, 350 g/l, for use on slabs receiving subsequent applied finishes and where noted on Drawings. Subject to compliance with requirements, provide one of the following:
 - a. Kurez DR VOX or Kurez W VOX, Euclid Chemical Company www.euclidchemical.com
 - b. Maxcure Resin Clear HS, US Spec www.usspec.com
 3. Clear Curing and Sealing Compound (Voc Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m² when applied at 300 sq. ft./gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products:
 - a. Chemrex Kure 1315, BASF Construction Chemicals www.chemrex.com.
 - b. Lumiseal WB, L&M Construction Chemicals www.lmcc.com
 - c. Radiance UV-25, US Spec www.usspec.com
 - d. Super Diamond Clear VOX, Euclid Chemical Company www.euclidchemical.com
 - e. VOCCOMP-30, W.R. Meadows www.wrmeadows.com
- G. Sealer: VOC compliant, acrylic copolymer type.
 1. Interior: ASTM C1315, Class A. Subject to requirements, Provide one of the following:
 - a. Vocomp-30, W. R. Meadows.
 - b. Euclid Super Aqua Cure VOX, Euclid Chemical Company.
 - c. Dress & Seal WB #30, L&M Construction Chemicals.
 - d. J-19, Dayton Superior.

2. Sealer for Ground Finish Concrete: As specified in Section 03 35 33.
3. Exterior: ASTM C1315, Class A. Provide one of the following:
 - a. Euclid Super Diamond Clear VOX, Euclid Chemical Company.
 - b. Lumiseal WB, L&M Construction Chemicals.
 - c. VOCOMP-30, W. R. Meadows.
 - d. Radiance UV-25, US Spec.
- H. Leveling Agent: Sonneborn Sonoflow, Euclid Flo-Top, Ardex K-15, L&M Construction Chemicals Levelex, US Spec "Self-Leveling Underlayment, or Dayton-Superior Levelayer 1 are acceptable products.
- I. Concrete Accessories: Gateway Engineering Company, Dayton-Superior Corporation, or Burke Concrete Accessories.
- J. Evaporation Retarder:
 1. Type: Monomolecular film, compatible with subsequent coatings and floor finishes.
 2. Acceptable Manufacturer and Products: L&M Construction Chemicals (E-Con), Master Builders (Confilm), Sika (Sika Film), W.R. Meadows (Evapre), US Spec (Monofilm ER), or Dayton Superior (Surefilm J-74)."

2.03 MIXES

- A. Design of Mixes: All mix designs shall be prepared in accordance with ACI 318-05, "Building Code Requirements for Structural Concrete", Section 5.3, "Proportioning on the Basis of Field Experience or Trial Mixtures".
- B. Selection of proportions for normal weight concrete: ACI 301.
- C. Mix and deliver ready-mixed concrete in accordance with requirements of ASTM C94, Option A.
 1. Not more than 90 minutes shall elapse from time water is introduced into the concrete mixture until completion of placement.
 2. Do not add water to mix that has stiffened to increase its workability.
 3. At no time shall concrete mix exceed a bulb thermometer reading of 90 degrees F. or over.
 4. Use ice or other method as reviewed by Architect, to keep concrete below 90 degrees F. temperature.
- D. All concrete must contain the specified water-reducing admixture or the specified high-range water-reducing admixture (superplasticizer). All thin concrete slabs, less than 8 inches in thickness placed at air temperatures below 50 degrees F shall contain the specified non-corrosive, non-chloride accelerator. All concrete slabs placed at air temperatures above 90 degrees F may require the use of a water reducing retarding admixtures.
- E. All concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, concrete for industrial slabs, synthetic fiber concrete, architectural concrete, self-consolidating concrete, concrete required to be watertight or concrete with a water/cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer).
- F. Durability Requirements - Water/Cementitious Ratio:
 1. All concrete subject to freezing and thawing shall have a maximum water/cementitious ratio of 0.50 (4000 psi at 28 days or more).

2. All concrete subjected to deicers, sulfates, and/or required to be watertight shall have a maximum water/cementitious ratio of 0.45 (4500 psi at 28 days or more).
 3. Water-cement ratio for concrete used for interior slab on grade construction: 0.40 to 0.45.
- G. Air Entraining Admixture: All concrete exposed to freezing and thawing and/or required to be watertight shall have an air content of 4.5 to 7.5 percent in accordance with ACI 212.3R. All interior, slabs subject to vehicular abrasion, shall have a maximum air content of 3 percent.
- H. Compressive strength (28 day): As shown on Structural Drawings.
- I. Slump - for consolidation by vibration: As shown on Drawings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to placing concrete:
1. Clean equipment involved.
 2. Remove debris and foreign material from the forms.
 3. Remove concrete laitance from reinforcing steel.
 4. Wet wood forms and masonry units in contact with concrete.
- B. No wood will be permitted to remain permanently inside the forms.
- C. Coordinate the necessary Trades as required to provide the sleeves, bolts, anchors, holes, etc., to be built in.

3.02 PLACING OF CONCRETE

- A. Concrete Work shall be performed in accordance with ACI-301 except as amended by this Section.
- B. Convey concrete from the mixer to place of final deposit by methods which will prevent segregation of aggregate or loss of material. Place concrete at such a rate that concrete is at all times plastic and to insure a practically continuous flow of concrete. Concrete not in place 1-1/2 hours after water has been added at batch plant may be rejected by Architect.
- C. Place concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not deposit concrete that has partially hardened or been retempered.
- D. Do not place concrete during rain unless adequate protection has been provided.
- E. Thoroughly compact concrete by suitable means during the placing, and work around the reinforcement and embedded items into the corners of the forms.
1. Use vibrators to aid in the placement of the concrete, operated by experienced personnel.
 2. Keep at least one spare operating vibrator on the job at all times during the concrete operations.
- F. Self-Consolidation concrete does not require vibration.

- G. Set reinforcing dowels connecting new concrete construction to existing with epoxy anchoring adhesive as indicated on Structural Drawings.

3.03 CONSTRUCTION, EXPANSION, AND CONTRACTION JOINTS

- A. Construction Joints: Provide as required to facilitate construction in accordance with reviewed shop drawings.
- B. Expansion and Contraction Joints: Place expansion and contraction joints where required to ensure that undesirable thermal and shrinkage cracking of slabs is minimized.
 - 1. See Drawings for locations of expansion and contraction joints in slabs-on-grade and in topping pours.
 - 2. If drawings do not indicate locations, verify with Architect prior to placement of slabs-on-grade and topping pours.
 - 3. Utilize early entry saw-cutting techniques using specialized equipment and procedures in accordance with the manufacturer of the saw-cutting equipment to saw-cut all joints in interior and exterior slabs within 2 hours of final finishing of the floor slabs while the concrete is still in its early green state.
 - a. Acceptable Equipment: Soff-Cut International, Inc., Corona, CA 1-800-776-3328 www.soffcut.com
 - 4. At exterior slabs-on-grade provide a 1/2 inch wide expansion joint wherever slabs abut vertical construction elements whether indicated or not.
- C. Additional reinforcing may be required at some construction, expansion/contraction and control joints, and shall be supplied and installed at no additional cost.
- D. Reinforcing shall be continuous through construction joints of reinforced slabs, unless otherwise indicated on Drawings. Placement schedule shall be submitted for approval.
- E. For slabs-on-grade, no concrete pour shall be longer than 100 feet or more than 4,000 square feet in area, unless early entry saw-cutting techniques are utilized for placement of joints in the slab while the concrete is still in a green state and prior to the slab developing expansion/contraction cracking at random location. Provide shear keys as detailed.

3.04 FINISHING VERTICAL (FORMED) SURFACES

- A. Formed surface finishes:
 - 1. Pits, tunnels, mechanical rooms and concealed surfaces: Remove fins, patch tie holes.
 - 2. Interior and exterior exposed surfaces: Remove fins, patch tie holes, stone joint marks, out-of-plane surfaces and other projections to produce uniform, smooth, dense concrete having the following formed finish Class and permitted abrupt or gradual irregularities as designated by ACI 347-04:
 - a. Vertical and horizontal exterior exposed surfaces: Class A Smooth Finish, 1/8 inch, except abrupt irregularities shall be removed.
 - b. Other surfaces prominently exposed to public view: Class A Smooth Finish, 1/8 inch, except abrupt irregularities shall be removed.
 - c. Concealed surfaces where covered by another finish: Class C, 1/2 inch, except abrupt irregularities shall be limited to 1/4 inch.

3.05 FINISHING HORIZONTAL SURFACES

- A. Rake concrete into place, screed and compact with a light tamp, except do not tamp topping and slabs not on grade. Screed with sawing motion and float surface to bring fines to the top.

- B. Mix and apply evaporation retarder in accordance with manufacturer's printed instructions immediately after floating. In extreme drying conditions, apply additional material as needed. Apply lightly on hard to trowel floor areas.
- C. When concrete has hardened sufficiently so that excess fines will not be brought to the surface, trowel slab with a steel trowel to a smooth surface free of pinholes and other imperfections. A mechanical trowel with rotating steel blades, approved by Architect, shall be used for this operation.
- D. After the surface has hardened sufficiently to ring under a trowel, trowel again with a steel trowel to a hard, burnished surface free of blemishes.
- E. Concrete slabs scheduled to receive ceramic or stone tile, concrete topping or similar finishes shall have a screeded finish but true and even to plane with no sharp projections or ridges.
- F. Use a 1/8 inch radius edger on edges of exposed Work. Use a deep cutting, 1/8 inch radius scoring tool or sawcutting to provide scoring for control joints as indicated unless otherwise noted or directed.
- C. Concrete Flatwork (Slab) Finishes: As specified herein and in Section 03 35 33 – Decorative Concrete Finishes, including the following:
 - 1. Smooth steel trowel finish.
 - 2. Sealed, smooth steel trowel finish.
 - 3. Sealed, ground finish concrete as specified in Section 03 35 33.
 - 4. Medium broom finish concrete.
- H. Finish floors shall meet requirements of ACI 302.1R for a Flat (3/16 in 10'-0") Classification. Floors scheduled to receive thin-set tile shall meet Very Flat (1/8 inch in 10'-0") Classification.

3.06 SLABS

- A. Saw cut or score contraction joint pattern indicated on Drawings. Use thick blade or scoring tool. Early entry saw shall be used immediately after final finishing and to a depth of 1-1/4 inches. A conventional saw or scoring tool shall cut 1/4 of the depth of slab thickness.
- B. Slope to drains to drains as indicated on Drawings, but not less than 1/4 inch per foot nominal across entire room or area to be drained.

3.07 REPAIR OF SURFACE DEFECTS

- A. Modify or replace concrete not conforming to required lines, detail and elevations. Grind high spots and fill low areas as required to provide finished floor tolerances as required for application of finish floor materials.
- B. Repair or replace concrete not properly placed, resulting in excessive honeycombing and other defects. Do not patch, repair or replace exposed architectural concrete except upon express direction of Architect.
- C. After forms are removed, fill tie rod holes, correct honeycomb spots, remove fins and clean and finish damaged surfaces. Wipe off excess mortar and rub to match adjoining surfaces.

- D. When excessive honeycombing is revealed, remove the defective material immediately after stripping forms to a depth of 3/4 inch to 1 inch. Cut edge of area perpendicular to surface to avoid feathered edges. Repair using the following method or submit method of repair and patching material to Architect and Structural Engineer for approval.
 - 1. Saturate with water for several inches beyond cutout and brush-in a grout consisting of equal parts Portland cement and sand. Follow immediately with the patching mortar. Leave the patch slightly higher than the surrounding surface. After an hour or two, finish flush with the adjoining surface. Wipe and rub patch to match adjoining surfaces. Keep patches moist for 7 days.
 - 2. Patching mortar shall consist of the same materials and proportions as the original concrete except that the coarse aggregate shall be omitted. When color match is required, adjust mixture to produce a finished color to match the adjoining concrete surfaces.
- E. Cracks caused by expansion, shrinkage and the like that occur in natural color concrete up through final acceptance of building shall be carefully repaired by epoxy injection or other method approved by the Architect.

3.08 CURING

- A. Protect freshly deposited concrete from premature drying and maintain without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
- B. Curing Methods: Cure concrete surfaces receiving finish materials, including, but not limited to; cementitious toppings, paint, and flooring, using one of the following two methods immediately after finishing operations. Consideration shall be given to the construction schedule impact and the compatibility of finish materials with the concrete when selecting a method.
 - 1. Keep concrete continuously moist for at least 7 days using polyethylene film, liquid membrane forming curing compound, or other acceptable covering. Interior floor slabs on grade shall be continuously moist cured for a minimum of 7 days in accordance with ACI standards.
 - 2. Liquid curing compounds shall not be acceptable unless it has been demonstrated that curing compound can satisfactorily serve as a base for finish materials or removed, resulting in a satisfactory base for adhesion of finish materials.
 - 3. Where approved for use, apply liquid curing compound in accordance with the Manufacturer's printed instructions.
 - 4. Refer to Structural Drawings for other acceptable curing procedures.
- C. Prevent rapid drying of the concrete at the end of the curing period.
- D. During the curing period, protect the concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibrations. Protect finished concrete surfaces from damage caused by construction equipment, materials or methods.

3.09 FLOOR SEALER

- A. At areas indicated on Drawings, provide 2 coats of sealer.
- B. Surface must be clean, dry and free of loose dirt, oil, wax, curing and parting compounds and other foreign matter.
- C. Apply each coat in accordance with Manufacturer's printed instructions.

3.10 FIELD QUALITY CONTROL

- A. Tests: Inspection and testing of concrete mix will be performed by a testing laboratory in accordance with Section 01 45 00.
1. Provide free access to Work and cooperate with appointed firm.
 2. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
 3. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 4. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 6. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 7. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 8. Take one additional test cylinder during cold weather concreting, and cure on job site under same conditions as concrete it represents.
 9. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed. .
 10. Concrete which does not meet the compressive strength requirement at 28 days will be rejected and removed from the Project, and disposed of in a legal manner.

3.11 PROTECTION

- A. Protect finished surfaces from stains or abrasions. Protect surfaces or edges by leaving forms in place or by providing temporary covers. Protect concrete from rain, flowing water or mechanical injury.
- B. Protect floor slabs from the droppings of plaster, paint, dirt, and other marring by covering with polyethylene plastic sheet, or other acceptable floor protection covering, well lapped and sealed.
1. Where concrete slabs are scheduled to be the finished floor surface, or where slab is treated with a special concrete finish serving as the finished floor surface, provide a continuous covering of 1/2 inch particle board, joints tightly butted and cut to sizes tight to wall construction, over entire floor area over polyethylene plastic sheet, or other acceptable floor protection sheeting. Maintain covering (polyethylene and particleboard) in good condition until danger of damage is past.

3.12 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION

SECTION 03 35 33

DECORATIVE CONCRETE FINISHES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Ground concrete finishing of interior concrete slabs-on-grade.
- B. Related Sections:
 - 1. Section 03 30 00 – Cast-in-Place Concrete and related section for forming, reinforcing and concrete materials.

1.02 SUBMITTALS

- A. In accordance with Section 03 30 00 - Cast-In-Place Concrete, and the following:

1.03 QUALITY ASSURANCE

- A. Standards: Install in accordance with the standards and specifications of manufacturer and the American Concrete Institute (ACI).
- B. Contractor Qualifications - Ground Finish Concrete: Ground concrete finish contractor shall provide a qualified foreman or supervisor who has a minimum of three years experience with grinding of concrete slab surfaces, and who has successfully completed at least five ground concrete finish installations of high quality and similar in scope to that specified herein.
- C. Field Samples:
 - 1. Provide on-site sample(s) of each type of exposed flatwork concrete finish showing texture and color before proceeding with finish to be used on this Project.
 - 2. Construct samples of each type of decorative finish concrete using processes and techniques intended for use on permanent work, including curing, grinding, sealing, and cleaning procedures.
 - 3. Samples shall be produced by the individual workers who will be performing the work for the project.
 - 4. Sample(s) shall be minimum 4'-0" square and have at least one longitudinal and one transverse joint.
 - 5. Construct sample panels in ample time to allow for finishing and curing before requesting Architect to review.
 - 6. Construct where directed by Architect and prepare successive sample panels as required until finish acceptable to Architect is produced.
 - 7. Since sample panels will constitute a basis of acceptance or rejection of the completed Work, do not remove sample panels until authorized in writing by the Architect. Dispose of sample panels in a legal manner when authorized.
- D. Static Coefficient of Friction: Decorative concrete finish floor and walk surfaces shall have a tested coefficient of friction of 0.71 minimum dry, 0.6 minimum wet for level surfaces and treads of stairs and 0.8 minimum wet or dry for ramp surfaces when tested in accordance with ASTM D2047 / UL410.

1.04 PROJECT CONDITIONS

- A. Concrete Work: In accordance with Section 03 30 00 - Cast-In-Place Concrete.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS AND ACCESSORIES

- A. Concrete Materials and Accessories: In accordance with Section 03 30 00 - Cast-In-Place Concrete.
- B. Reinforcement: As specified in Section 03 20 00.

2.02 DECORATIVE CONCRETE FINISH MATERIALS AND ACCESSORIES

- A. Ground Finish Concrete Sealer and Finish: Provide one of the following:
 - 1. Hard Surface Sealer: Seel-All Hard Surface Seal as manufactured by Cantol www.cantol.com
 - 2. Floor Finish: Acrymet "Plus" – Deep Gloss Floor Finish as manufactured by Cantol.

2.03 CONCRETE MIX DESIGN

- A. Concrete Mix Design: As specified in Section 03 30 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 PREPARATION

- A. Concrete Work: In accordance with Section 03 30 00 - Cast-In-Place Concrete and related Sections.
- B. Ground Finish Concrete: Clean concrete of loose foreign matter before beginning terrazzo ground finish concrete operations.

3.03 GROUND FINISH CONCRETE

- A. Concrete placement, construction joints, expansion joints, contraction joints, and Initial slab finishing shall be in accordance with Section 03 30 00.
- B. Ground Finish Concrete:
 - 1. Rough Grinding: Grind with 26 grit diamond plugs to remove surface and expose fines. Maintain specified concrete flatness.

2. Following initial grind with two or three additional grinds using 80 grit diamonds and 80 grit stones to achieve desired initial ground appearance (amount of aggregate exposure).
 3. Cleanse floor with clean water and rinse. Remove excess rinse water to prevent staining.
 4. Steel trowel portland cement grout onto surface to fill voids, cement grout to match color of concrete, allow to cure overnight.
 5. Fine Grinding: Grind with 80 grit (or finer) stones to remove grout and 120 grit diamonds until desired surface finish is achieved.
 - a. Finish: Depth and percentage of grind as indicated on Drawings and to match as approved Field Sample.
 6. Wash all surfaces with neutral cleaner with Ph factor between 7 and 10, biodegradable and phosphate free.
 7. Rinse with clear water and allow to surface dry.
- C. Application of sealer:
1. Verify ground finish concrete is thoroughly cleaned and dry prior to application of sealer.
 2. Apply liquid finish to ground concrete finish surfaces to comply with manufacturer's instructions, as follows:
 - a. Apply two coats hard surface sealer.
 - b. Apply two coats floor finish over hard surface sealer.

3.04 FIELD QUALITY CONTROL

- A. In accordance with Section 03 30 00 - Cast-In-Place Concrete.

3.05 PROTECTION AND MAINTENANCE

- A. General: In accordance with Section 03 30 00 - Cast-In-Place Concrete.
- B. Protect floor from traffic for at least 72 hours after final application of sealer.

END OF SECTION

SECTION 04 01 20.52

UNIT MASONRY CLEANING

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. Performance Requirements: The application of chemical cleaner shall leave the finished surfaces uniform in color and shall not alter the natural texture of the masonry units.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 5 years.
 - 2. Applicator: Trained, approved and accepted by the cleaning compound manufacturer. Application personnel shall have at least 2 years experience with the particular materials being applied.
- B. Field Samples:
 - 1. A test area of wall surface from 10 to 20 square feet in size shall be cleaned with the chemical cleaner recommended by the cleaning compound manufacturer for acceptance by the Architect.
 - 2. Test samples of adjacent non-masonry materials for possible reaction with the diluted cleaning materials. Samples to be available for review by the Architect.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Delivery shall be made to the job site in manufacturer's original containers with seals unbroken and labeled with manufacturer's batch number.
- B. Storage and Protection:
 - 1. Store materials in original, unopened containers in compliance with manufacturer's printed instructions.
 - 2. Do not store in areas where temperature will fall below 20 degrees F. or rise above 100 degrees F..

1.04 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Temperature and relative humidity conditions for a period before, during and after application shall be as recommended by the manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Chemical Cleaner:
 - 1. Cleaner shall be a solution of blended liquid acids, heavily inhibited and emulsified and in combination with special wetting systems.
 - 2. Specific product selection shall be dependent upon substrate as recommended by the chemical cleaner manufacturer.
 - 3. Cleaner shall be acceptable to the masonry unit manufacturer.
 - 4. Muriatic acid shall not be acceptable as a chemical cleaner for new masonry.

5. Subject to compliance with specification requirements, Sure-Klean Vana Trol, Sure-Klean No. 600 Detergent and Sure-Klean 101 Lime Solvent as manufactured by ProSoCo, Inc., www.prosoco.com or 202V Vana-Stop , 202 New Masonry Detergent and 200 Lime Solve as manufactured by Diedrich Technologies www.diedrichtechnologies.com are acceptable products.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 1. Prior to start of work, carefully inspect the installed work of other trades, and verify that such work is complete to the point where this work may commence.
 2. The chemical cleaner manufacturer's representative shall verify that the chemical cleaner may be applied in accordance with the manufacturer's recommended methods.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Commencement of system application constitutes acceptance of surfaces by applicator.

3.02 PREPARATION

- A. Protection:
 1. Use all means necessary to protect the installed work of other trades.
 2. Concrete sidewalks shall be protected from runoff by soaking with water immediately prior to application on adjacent walls.
 3. Adjoining glass, metal and painted surfaces shall be protected from overspray and splash of chemical cleaner. Inadvertent splashes shall be removed in an approved manner before the solution has damaged the surface.
 4. In the event of damage, immediately make all repairs and replacements necessary to the approval of Architect and at no additional cost to Owner.
- B. Surface Preparation for Chemical Cleaner:
 1. In strict accordance with manufacturer's printed instructions.
 - a. Masonry walls shall be cleaned within 14 to 28 days after installation.
 - b. Walls shall be free of excess mortar.
 - c. Cracks, other than hairline cracks, shall be pointed up.
 - d. Defective mortar joints shall be routed out, pointed with mortar and tooled.
 2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- C. Presoaking Hoses:
 1. Adequate water supply shall be made available to assure thorough pre-soaking and thorough rinsing of the wall before undertaking general cleaning.
 2. Two water hoses shall be used by the cleaning crew.
 3. One hose shall be attached to a length of lawn soaker hose placed along the top of the wall to provide a uniform and complete saturation of the entire wall area.
 4. The second hose shall provide a copious flow of water for thorough flushing of excess mortar and dirt from the scrubbed areas.
 5. The lawn soaker hose is later to be placed at the face of the scaffold or stage to provide a continuous spray of wall areas below the working area.

3.03 APPLICATION

- A. Chemical Cleaner: Application to be in strict accordance with manufacturer's printed instructions and as follows:
1. Surfaces shall be thoroughly pre-soaked with clean water to prevent the absorption of the cleaning solution within the pores of the masonry.
 2. Cleaning solution shall be diluted with clear water and applied to pre-soaked wall areas with a long handled stiff fibered masonry wall washing brush, or other brush as recommended by the cleaning compound manufacturer. The cleaning solution may also be applied with a garden-type low pressure sprayer having a maximum nozzle pressure of 50 psi. Allow the solution to remain on the wall 5 to 10 minutes, or as recommended by the cleaning solution manufacturer. Wooden paddles or other non-metallic tools may be used to remove stubborn particles. Cleaning shall be restricted to small areas of up to 20 square feet at a time.
 3. After washing a given area, the wall shall be flushed with a copious amount of clear water, working from top to bottom, before the solution dries on the wall surface. All of the cleaning solution shall be completely rinsed off of the wall.
 4. Rinsing water may be applied with a high-pressure hose system with a maximum nozzle pressure of 700 psi. The high-pressure nozzle tips shall have a fan spray angle of from 15 to 45 degrees. The high-pressure system shall have a water flow rate of 3 to 8 gallons per minute. Care shall be taken to avoid damaging the brick unit or the mortar joints with the high-pressure water spray.
 5. Repeat the procedure on spots which require additional cleaning.
 6. Clean roof side and top of parapet walls.

END OF SECTION

SECTION 04 05 15

MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SUBMITTALS

- A. Mix Designs:
 - 1. Submit mix designs and samples to the Architect for review prior to delivering materials to the site or commencing the Work.
 - a. Mortar Mix Design: Furnish in accordance with ASTM C270.
 - b. Grout Mix Design: Furnished by either the grout supplier or an independent testing laboratory. Submit comprehensive strength data with mix design submittals when pozzolans are used.
 - 2. Submit written colored mortar proportions for each color of mortar to be supplied for review by the Architect.
- B. Samples: Submit mortar channels for color selection.
- C. Product Data: If alternative mortar materials are to be provided, submit current instructions stating the actual quantities and mixing instructions for alternative mortar materials to conform to specified requirements.
 - 1. Submit test report data substantiating compliance with specified performance requirements.
 - 2. Submit current ICC Evaluation Report.

1.02 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Cementitious materials shall be stored off the ground, under cover and shall be kept dry.
- B. Preblended Mortar Mix Delivery System: The use of dry preblended mortar silos and bulk bags shall be acceptable. Bulk bags and silos shall be sealed to prohibit contamination of the ingredients and to keep the materials dry until mixed.

1.03 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Hot Weather Requirements: Wet mortar board before loading and cover mortar to retard drying when not being used.
 - 2. Cold Weather Requirements: In accordance with "Recommended Practices and Guide Specifications for Cold Weather Masonry Construction" by IMIAC; provide adequate equipment for heating the mortar and grout materials, when air temperature is below 40 degrees F.. Temperatures of the separate materials, including water, shall not exceed 140 degrees F. when placed in the mixer. When air temperature is below 32 degrees F., maintain mortar temperature on boards above freezing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mortar:

1. Cement: Type II Portland cement conforming to ASTM C150.
2. Aggregate: Clean, sharp and well graded and free from injurious amounts of dust, lumps, shale, alkali, surface coatings and organic matter, conforming to ASTM C144, except that no less than 3 percent nor more than 10 percent shall pass a No. 100 sieve.
3. Hydrated Lime: ASTM C207, Type S.
4. Water: Clean and potable.
5. Admixtures:
 - a. Chemical: The use of accelerator admixtures, water reducing plasticizers and other chemical admixtures shall not be allowed.
 - b. Mineral: In accordance with Section 03 05 05.
 - c. Water-Repellent Admixture: In accordance with Section 04 05 26.
 - d. Alternative Plasticizer: Pozzolanic formulation consisting of a combination of hydroxy aluminum silicates and diatomite:
 - 1) Alternative Plasticizer Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 5 years.
 - 2) Mortar mix design shall be in accordance with ICC Evaluation Report, in accordance with the mortar type specified elsewhere in this specification.
 - 3) Provide alternative plasticizer in accordance with manufacturer's printed instructions, including specific mixing instruction.
 - 4) No other admixtures shall be used in conjunction with the alternative plasticizer unless approved in writing by the alternative plasticizer manufacturer.
 - 5) Packing and Shipping: Mortar admixture(s) shall be delivered to the job site in manufacturer's original containers with seals unbroken and labeled with manufacturer's batch number.
6. Mortar Color:
 - a. Color: Matching integral colored decorative faced CMU units as approved by Architect.
 - b. Provide limeproof, inorganic compounds which shall not exceed 15% by weight of the cement, unless otherwise directed by Manufacturer.
 - c. Carbon black shall not exceed 3% by weight of the cement.
 - d. Factory blend color for full color saturation of mortar joint and factory package for unitized jobsite mixing at a ratio of one unit of color per sack of cementitious material, (portland cement, lime, or masonry cement).

B. Grout:

1. Cement: Type II Portland cement conforming to ASTM C150.
2. Aggregate: ASTM C404 and as follows:
 - a. Sand: Size No. 1 for fine aggregate.
 - b. Pea Gravel: Size No. 8 for coarse aggregate.
3. Water: Clean and potable.

2.02 MIXES

A. Mortar: ASTM C 270, Type S.

1. Measurement: Accurately measure materials by ASTM C270 by the Property Method per Table 2.

2. Mix cementitious materials and aggregates 3 to 5 minutes in a mechanical mixer. Small amounts of mortar may be mixed by hand. Adjust consistency of the mortar depending on the absorptive quality of the units being laid, and to the satisfaction of the mason.
 3. If mortar begins to stiffen, it may be retempered by adding water within a basin formed by the mortar, and remixing.
 4. Use within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set or after it has become harsh or non-plastic.
 5. Mix color in a specific and exacting ratio in accordance with the Architect's reviewed submittals.
 6. Water-Repellent Admixture: In accordance with Section 04 05 26.
 7. Preblended Mortar Mix: Provide mortar as specified herein, except that dry ingredients may be preblended and bulk packaged for delivery to a jobsite silo (which loads into batch mixer) or bagged for hand loading into mixer. Moisture shall be extracted from sands. Digital printouts displaying the proportions of each batch shall be submitted to the Architect upon request. Mixing shall be accomplished by mechanical mixer in accordance with instructions provided by Preblended Mortar Mix Distributor.
- B. Grout:
1. Job-Site Mixed: In accordance with ASTM C476.
 2. Transit-Mixed:
 - a. Designed by the supplier or an independent testing laboratory with a minimum compressive strength of 2000 psi (140mPa) in 28 days, unless higher strength is required by the Structural Drawings and Notes.
 - b. Slump: Not to exceed 8 inches, unless otherwise noted on Drawings.
 - c. Use within 1-1/2 hours of initial mixing and use no grout after it has begun to set or after it has become harsh or non-plastic.
 - d. Course grout may be used in cavity walls with a horizontal dimension of 2 inches or more, and in hollow cell construction 4 inches or more in both horizontal directions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation of mortar and grout shall be as specified under each of the following Sections and in accordance with AMG Standard 108:
 1. Section 04 22 00 – Concrete Unit Masonry
- B. Colored Mortar: Consistency of appearance shall be maintained throughout the Project.
- C. Temperature: Mortar and grout shall have a temperature between 50 degrees F. and 90 degrees F. while being used.
- D. Grout may be poured by hand bucket, concrete hopper or through a grout pump. Grout spaces shall not be wet down prior to pouring grout.

3.02 FIELD QUALITY CONTROL

- A. General: Tests and inspections as necessary to verify quality and strength of mortar and grout. Laboratory tests shall conform to applicable ASTM standards and tests.

- B. Tests:
1. Frequency: As determined by the Architect based upon total time for construction of masonry with not less than two tests per each level of masonry construction, foundation to roof or floors.
 2. Testing Laboratory: Inspection and testing of mortar and grout will be performed by a testing laboratory in accordance with Section 01 45 00. The testing laboratory, in addition to meeting requirements of ASTM E329, must be an approved laboratory competent to perform cement physical testing.
 3. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Architect, Contractor, masonry contractor, and the grout supplier if applicable.
- C. Mortar:
1. Property Specification (ASTM C270): Testing in accordance with ASTM C 780.
 2. For determining hardened mortar properties, prepare 3 test specimens for each test age and property. A strength test shall be the average of the strengths of the specimens tested at the age specified. Specimens shall be tested at 7 and 28 days.
- D. Grout:
1. Testing per ASTM C1019.
 2. Three test specimens shall constitute one sample. A strength test shall be the average of the strengths of the specimen tested at the age specified.
 3. Specimens shall be tested at 7 and 28 days.
 4. The compression strength will be considered satisfactory if the average of three consecutive tests of the grout is equal to or greater than the specified strength and no individual strength test falls below the specified strength by more than 500 psi.

3.03 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION

SECTION 04 05 26

CMU INTEGRAL WATER REPELLENT

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. Performance Requirements: Water repellent admixture shall be provided in both the masonry units and mortar used in all exterior exposed CMU wall construction, and shall constitute a complete integral water repellent system for exterior above grade walls meeting the following requirements:
1. Admixture shall leave the finished surfaces water repellent and shall not alter the natural texture or color of the masonry units.
 2. Admixture shall provide wind driven rain resistance equivalent to Class E Rating as measured by ASTM E514-74.
 3. Bond strength as determined by ASTM E72 shall not be reduced by the use of the water repellent admixture.

1.02 QUALITY ASSURANCE

- A. Qualifications:
1. Water Repellent Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 5 years.
 2. Masonry Unit Fabricator/Manufacturer: Trained, approved and accepted by the manufacturer.
- B. Regulatory Requirements: Use of water repellent admixtures shall be in strict accordance with applicable Federal, State and local requirements, including, but not limited to, environmental regulations.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Mortar admixture shall be delivered to the job site in manufacturer's original unopened containers and packaging, with labels clearly identifying product name, manufacturer, and batch number.
- B. Store admixture in clean, dry area indoors in accordance with manufacturer's instructions; keep containers sealed until ready for use, keep from freezing, do not use admixture once frozen.
- C. Protect admixture during handling to prevent damage or contamination.

1.04 WARRANTY

- A. Water Repellent Manufacturer: Water-repellent shall be warranted by Admixture manufacturer to be free of defects and to meet manufacturer's published physical and chemical properties.
- B. CMU producer shall warrant that Integral Polymeric CMU Water-repellent has been provided at appropriate dosage rate in all units shipped to this project for use in exterior walls.

- C. Masonry Installer shall warrant that only CMUs and mortar containing Integral Polymeric CMU Water-repellent have been placed in exterior walls and that admixture was included in the mortar mix in accordance with water repellent manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Water-Repellent Admixture: The following shall be included in exterior masonry units.
1. Liquid polymeric admixture(s) formulated for mixing with mortar mix and formulated for mixing with concrete during production of concrete masonry units to cross link and provide resistance to water penetration to achieve a Class E Rating when tested in accordance with ASTM E514.
 2. Admixture shall not reduce flexural and compressive strength of mortar when tested in accordance with ASTM C1072 and C780.
 3. Concrete Masonry Unit Manufacturer: Acceptable to integral water repellent manufacturer and qualified by integral water repellent manufacturer to comply with ASTM E514 for water permeance testing.
 4. Acceptable Products include the following:
 - a. Dry Block Mortar Admixture as manufactured by W.R. Grace & Co. - Conn., Cambridge, MA (800) 558-7066. www.grace.com
 - b. Eucon Blocktite Mortar Admixture as manufactured by The Euclid Chemical Company, Cleveland, Ohio (800) 321-7628 www.euclidchemical.com
 - c. RainBloc admixture as manufactured by ACM Chemistries, Inc. www.acmchem.com

PART 3 EXECUTION

3.01 ERECTION, INSTALLATION, APPLICATION

- A. In accordance with Sections 04 05 15 and 04 22 00 and manufacturers recommendations.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SUBMITTALS

- A. Test Reports: Submit test results clearly indicating classification of concrete masonry units in accordance with ASTM C90 requirements.

1.02 QUALITY ASSURANCE

- A. Standards:
 - 1. The "Levels of Quality", Standard 107 of Arizona Masonry Guild (AMG) shall apply and by reference is hereby made a part of this Specification. Reference to Custom, Standard or Economy in this Specification shall be as defined in latest edition of AMG Standard 107.
 - 2. Comply with the requirements of ACI 530.1/ASCE 6 "Specifications for Masonry Structures", except as otherwise indicated.
- B. Regulatory Requirements: Masonry materials and workmanship shall meet requirements of building codes which are applicable to jurisdiction in which Project is located.
- C. Certifications: Concrete masonry units shall be supplied by a manufacturer participating in the Certified Block Program of the Arizona Masonry Guild.
- D. Installer Qualifications: The Masonry Subcontractor shall have a supervisor on the jobsite, whenever masonry work is being performed, who is Certified by the Arizona Masonry Contractors Association. Proof of certification shall be submitted to the Architect prior to start of masonry work.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Transport and handle masonry units in such a manner as to prevent chipping and breakage.
- B. Deliver and store materials in dry, protected areas.
- C. Keep free of stain or other damage.
- D. Locate storage piles, pallets, stacks or bins to avoid or protect material from heavy or unnecessary traffic.
- E. Replace damaged material at no cost to Owner.

1.04 PROJECT/SITE CONDITIONS

- A. Hot Weather Requirements:
 - 1. When ambient air temperature exceeds 100 degrees F., or when ambient air temperature exceeds 90 degrees F. and wind velocity is greater than 8 mph, Masonry Contractor shall implement hot weather protection procedures as submitted to Architect.
 - 2. Do not spread mortar beds more than 4 feet ahead of placing block units.
 - 3. Place block units within one minute of spreading mortar.

- B. Cold Weather Requirements:
 - 1. Fully protect concrete masonry units against freezing by a weather-tight covering which shall also prevent accumulation of ice.
 - 2. Do not lay concrete masonry units when temperature of surrounding atmosphere is below 40 degrees F. or is likely to fall below 40 degrees F. in the 24 hour period after laying, unless adequate protection is provided.

1.05 SCHEDULING AND SEQUENCING

- A. Coordination: Coordinate with other Trades whose Work relates to concrete masonry unit installation for placing required blocking, backing, furring, conduits and other items.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General Requirements for Concrete Masonry Units:
 - 1. Concrete masonry units shall meet ASTM C90 requirements except that when CMU will be exposed in final construction, ASTM C90-00, paragraph 7.2.1 shall be modified to read: "Three percent of a shipment containing chips not larger than 1/2 inch in any dimension, or cracks not wider than 0.02 in. and not longer than 10 percent of the nominal height of the unit is permitted." Linear shrinkage of units of units shall not exceed 0.065 percent.
 - 2. Units shall be in the same condition in wall as they were upon delivery.
 - 3. Unit sizes shall be as indicated on Drawings.
 - 4. Surface of units shall be clean and free from dirt when laid in walls.
 - 5. Units not complying with the appropriate ASTM Standards and AMG Standard 107 shall not be laid in the wall where exposed to view. Any unit that is chipped in excess of the requirements of AMG Standard 107 will be rejected and shall be removed and replaced.
 - 6. Provide special block sizes and shapes required or as shown on Drawings.
 - 7. Water-Repellent Admixture: In accordance with Section 04 05 26. Concrete masonry units used to construct exterior building walls shall contain the recommended amount of integral water repellent admixture, as per manufacturer's certification program.
- B. Hollow CMU Classifications: The following requirements shall apply to all shapes, colors, textures and sizes of CMU provided.
 - 1. Medium weight units: Weighing 105 lbs. per cubic foot to less than 125 lbs. per cubic foot and manufactured from a combination of volcanic scoria aggregate conforming to ASTM C331 and sand conforming to ASTM C33.
 - 2. Normal weight units: Weighing 125 lbs. per cubic foot or more and manufactured with sand conforming to ASTM C33.
- C. Standard Smooth Faced CMU: Manufacturer's standard smooth faced units.
- D. Fluted Split Faced CMU:
 - 1. Units shall be 9 x 8 x 16 inches or as otherwise shown on Drawings with some variation allowed in width and length due to splitting.
 - 2. Furnish units split on 1, 2 or 3 faces as required by the design.

- E. Accessory Units: Provide units as required for window sills and jambs, doors, control joints, bond beams, lintels, pilaster, caps and other locations as indicated on Drawings with a minimum of block cutting. Accessory units shall match adjacent unit color and texture unless noted otherwise.

2.03 ACCESSORIES

- A. Joint Reinforcing: Joint reinforcing in accordance with requirements of IBC 2006, Chapter 21.
- B. Reinforcing Steel: As specified under Section 03 20 00.
- C. Control Joints:
 - 1. Rubber: Extruded, solid section, ASTM D2000 2AA-805 with a durometer hardness of 70 or 80 when tested per ASTM D2240.
 - 2. Polyvinyl Chloride (PVC): ASTM D2287, Type PVC 654-4 with a durometer hardness of 85 (+5) when tested per ASTM D2240, minimum tensile strength of 1750 psi with minimum 300 percent elongation per ASTM D638, and cold crack brittleness of 50 degrees F per ASTM D746.
 - 3. Sizes and Profiles: As indicated on Drawings.
- D. Mortar and Grout: As specified under Section 04 05 15. Provide water repellent admixture in accordance with Section 04 05 26.
- E. Sheet Metal Flashings: See Section 07 60 00. Furnish shapes in accordance with project requirements and NCMA TEK 19-2A, 19-4A and 19-5A.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Installer shall examine supporting structure and conditions under which unit masonry is to be installed, and notify Contractor, in writing, conditions detrimental to proper and timely completion of Work. Do not proceed with the installation of unit masonry Work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Do not use units with chips, cracks, or other defects which might be visible in the finished Work unless otherwise acceptable to the Architect.
- C. Do not build on frozen Work; remove and replace unit masonry Work damaged by frost or freezing.
- D. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower freezing point of mortar by use of admixtures or anti-freeze agents, and do not use calcium chloride in mortar or grout.

3.02 PREPARATION

- A. Protection: Protect sills, ledges, offsets and other projections from dropping of mortar and grout.

3.03 ERECTION, INSTALLATION, APPLICATION

- A. General Requirements for Concrete Masonry Walls:
1. Workmanship:
 - a. Provide Standard Level workmanship as defined by AMG Standard 107.
 - b. Concrete masonry units which will be exposed in the finished work shall be treated as an architectural finish and shall be handled carefully to ensure that chippages do not occur during handling and laying. Handling shall be minimized on the jobsite to eliminate chances for chippage.
 2. Lay units in uniform and true courses, level and plumb to height indicated on Drawings.
 3. Lay concrete unit masonry in such a way that cracks are not formed at time unit is placed in wall.
 4. Units shall not be wetted before being used and shall be laid dry.
 5. Adjusting Units:
 - a. Units shall be adjusted to be level, plumb and straightened into final position in wall while mortar is still soft and plastic enough to ensure a good bond.
 - b. Avoid over-plumbing and pounding of corners and jambs to fit stretcher units after they are set in position.
 - c. If position of unit is shifted after mortar has stiffened, or bond is broken or cracks are formed, re-lay unit in new mortar.
 6. Bearings on Walls: Provide 3 courses of solid units or grouted hollow masonry units below steel bearing plates or beams bearing on walls. Extend bearings each side of contact with load as required to properly transfer loads into wall.
 7. Openings: Provide openings in masonry walls where required or indicated. Steel lintels shall be provided unless otherwise noted.
 8. Cutting of masonry: When required, exposed block units shall be cut with a power driven Carborundum or diamond disc blade saw. When using "wet" cutting methods, clean water shall be used on exposed units.
 9. Anchor masonry units facing against or abutting concrete members to concrete by use of dovetailed flat bar anchors inserted in slots built into concrete.
 - a. Space anchors not more than 16 inches vertically and 24 inches horizontally.
 - b. Maintain a space not less than 1/2 inch width between masonry and concrete members, keeping space free of mortar or other rigid materials so as to permit differential movement.
- B. Bonding:
1. Bond pattern shall be regular running bond unless indicated otherwise on the drawings.
 2. Bond shall be plumb throughout face of wall.
- C. Bearing Wall Intersections:
1. Intersecting block bearing walls shall not be tied together in a masonry bond, except at corners.
 2. One wall shall terminate at face of other wall with a control joint at intersection.
 3. Tie intersecting wall together with a metal tie bar, 1/4 inch x 1-1/4 inches x 2'-4" long with a 2 inch right angle bend at each end of bar, spaced vertically at 2 feet on center.
 4. Bends at ends of tie bars shall be embedded in grouted cells.
 5. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 6. Provide sealing of control joint as specified in Section 07 92 00.

- D. Non-Bearing Wall Intersections:
1. Tie non-bearing wall together with strips of metal lath or galvanized 1/4 inch mesh hardware cloth placed across joint between 2 walls placed in alternate horizontal block courses.
 2. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 3. Provide sealing of control joint as specified in Section 07 92 00.
- E. Joining of Work:
1. Where fresh masonry joins partially set masonry the exposed surface of the set masonry shall be cleaned and lightly wetted so as to obtain the best possible bond.
 2. Remove loose concrete block and mortar.
 3. Stop-off a horizontal run of masonry by racking back 1/2 brick length in each course and, if grout is used, stopping the grout 4 inches back of the rack.
 4. Tothing will not be permitted, except upon written approval of the Architect.
- F. Mortar Joints:
1. Joints shall be straight, clean and a uniform 3/8 inch thickness on exposed wall face and in accordance with NCMA TEK 19-2A.
 2. Exposed to view CMU shall be tooled when mortar is “thumbprint” hard with round or other approved jointer, slightly larger than the width of the joints to produce a dense, slightly concave tooled surface which is well bonded to block at edges.
 3. Solidly fill joints from face of unit to depth of face shell, except where specified otherwise.
 4. Full bedding to be provided for first course on foundation and wherever maximum strength is required.
 5. Butter vertical head joints well and shove these joints tight so that mortar bonds well to both units.
 6. Full coverage to be provided on bed of face shells and webs surrounding cells to be filled.
 7. Bee-holes or other open joints shall be filled and tooled with mortar while mortar is still fresh.
- G. Control Joints:
1. Provide control joints, as detailed, at vertical masonry walls where such walls exceed 40 feet in length. In long length of walls, provide joints at approximately 24 feet on center or as detailed.
 2. Control joints shall be continuous full height of walls.
 3. At bond beams, control joints shall separate both block and grout; however, steel reinforcing shall be continuous.
 4. Horizontal wire reinforcing shall not run through control joint.
 5. Control joints shall not occur at wall corners, intersections, ends, within 24 inches of concentrated points of bearing or jambs or over openings unless specifically indicated on Structural Drawings.
 6. Control joint materials shall be held back from finished surface as required to allow for sealant and back-up materials.
- H. Horizontal Joint Reinforcing:
1. Place horizontal joint reinforcing every 16 inches vertically throughout wall construction.

2. Continuously reinforce first bed joint immediately above and below openings. Provide reinforcing in second bed joint above and below openings which extends 2 feet beyond each side of opening.
 3. Lap reinforcement a minimum of 6 inches at splices.
 4. Cut and bend reinforcing at corners.
- I. Vertical Reinforcing and Bond Beam Reinforcing:
1. Place in accordance with requirements of Drawings.
 2. Vertical Reinforcement: Provide continuous reinforcing full height of wall at wall ends, corners, intersections, jambs of openings and each side of control joints. Vertical reinforcing shall match and lap dowels which are at top of foundation walls and precast concrete beams.
 3. Bond Beams: Provide horizontal reinforcing of 2 bars in minimum 8 inch deep grouted continuous bond beam at roof and elevated floor lines.
 4. Parapets: Provide horizontal reinforcing of 1 bar in minimum 8 inch deep grouted continuous bond beam at top of parapets.
 5. Bond Beam and Parapet Reinforcing at Vertical Control Joints: Place bars continuous through control joint and wrap mastic tape around bars for 18 inches each side of control joint.
 6. Bond Beam and Parapet Reinforcing at Corners and Wall Intersections: Provide bent bars to match reinforcing at corners and wall intersections.
 7. Lap splices in reinforcing in accordance with Structural Drawings.
 8. Use spacers to position reinforcing steel in center of grout at center of wall as required by code.
- J. Grouting:
1. Reinforcing steel is to be in place and inspected before grouting starts.
 2. Vertical cells to be filled shall have vertical alignment to maintain a continuous cell area.
 3. Keep cell to be grouted free from mortar.
 4. Fill cells solidly with grout in lifts not to exceed 5 feet.
 5. Grout may be poured by hand bucket, concrete hopper or through a grout pump.
 6. Do not wet down grout space prior to pouring of grout.
 7. Stop pours 1-1/2 inches below top of cell to form a key at pour points.
 8. Grout shall be consolidated by mechanical vibration during placing before loss of plasticity in a manner to fill grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated, or rodded.
 9. Grout barrier below bond beams shall be continuous wire lath or other approved material.
 10. Grout beams over openings and bond beams in a continuous operation.
 11. Solidly grout in place bolts, anchors and other items within wall construction.
 12. Fully grout jambs and head of metal door frames connected to masonry. Filling of frames shall be done as each 2 feet of masonry is laid.
 13. Use extreme care to prevent grout or mortar from staining face of the masonry.
 14. Immediately remove grout or mortar which is visible on face of masonry.
- K. Provisions for Other Trades and Built-in Items:
1. Build in items required and indicated, including; but not limited to, reinforcing steel, anchors, flashings, sleeves, frames, structural steel, loose lintels, anchor bolts, nailing blocks, door and window frames and miscellaneous iron.
 2. Enclosures for pipes, stacks, ducts and conduits:
 - a. Construct slots, chases, cavities, and similar spaces as required.

- b. Where masonry is to enclose conduit or piping, bring it to proper level indicated and as directed.
- c. Cover no pipe, conduit chases or enclosures until advised that Work has been inspected and approved.

- L. Tolerances; Standard Level of Quality: In accordance with AMG Standard 107.
- M. Joint and Crack Control: In accordance with NCMA TEK 10-1.
- N. Weep holes shall be provided above lintels and vertical obstructions as per manufacturer's flashing and weep hole diagrams.

3.04 FIELD QUALITY CONTROL

- A. Masonry Tests: Inspection and testing of masonry will be performed by a testing laboratory in accordance with Section 01 45 00.
 - 1. Provide free access to Work and cooperate with appointed firm.
 - 2. A set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 (formerly E447) Method B for each 5,000 square feet of wall area, but not less than one set of 3 masonry prisms for the Project.

3.05 ADJUSTING

- A. Pointing of Mortar Joints:
 - 1. Point and fill holes and cracks in exposed mortar joints.
 - 2. Cut out defective mortar joints to a depth of at least 1/4 inch.
 - 3. When cutting is complete, remove dust and loose material by brushing or vacuuming.
 - 4. Prehydrate mortar for pointing by mixing dry ingredients with only sufficient water to produce a damp mass of such consistency that it will retain its form when it is pressed into a ball with hands, but will not flow under trowel.
 - 5. Allow mortar to stand for a period of not less than one hour nor more than 2 hours, after which remix with addition of sufficient water to produce satisfactory workability.
 - 6. Pointing mortars shall be identical to adjacent mortar in similar joints and finish results shall match and be indistinguishable from original mortar used.
 - 7. Premoisten joint and apply mortar tightly.
 - 8. Tool to match adjacent joints.
 - 9. Moist cure for 72 hours.
- B. Patching: If approved by Architect, patching of exposed masonry walls shall be done at conclusion of general Work and shall conform as closely as possible to similar surrounding or adjoining Work.

3.06 CLEANING

- A. Daily Cleaning:
 - 1. Keep walls clean.
 - 2. Masonry which is soiled from mortar and grout spills, or other dirt, splatters or debris, which will be exposed to view at completion of Project shall be cleaned immediately with stiff fiber brushes until wall is free of dropped or spattered mortar.
 - 3. Do not clean walls by sand blasting or high-pressure power washing.
- B. Clean CMU which will be exposed in the finished Work in accordance with Section 04 01 20.52 – Unit Masonry Cleaning.

- C. Remove scaffolding and equipment used in Work.
- D. Clean up debris, refuse and surplus material and remove from premises.

3.07 PROTECTION

- A. Furnish temporary protection for exposed masonry corners subject to injury.
- B. Carefully cover tops of walls left incomplete at conclusion of day's Work with tarpaulins or other approved covering.
- C. In hot and dry weather, protect masonry against too rapid drying.
- D. Protect finished Work against freezing for a period of not less than 48 hours by means of enclosures, artificial heat, or such other protective methods as may be required.

END OF SECTION

SECTION 05 10 00

STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Structural steel framing including, but not limited to:
 - 1. Columns
 - 2. Beams
 - 3. Lintels
 - 4. Anchor Bolts
 - 5. Bearing Plates
 - 6. Other Miscellaneous Structural Steel Items.
- B. Related Sections:
 - 1. Section 05 50 00 – Metal Fabrications, for non-structural steel fabrications including steel plate wall caps and window sills, custom steel tube framed gates, and wire mesh wall vents.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop and erection Drawings clearly showing each piece required for fabrication and erection. Drawings shall include material grade, camber, holes and other pertinent data. Indicate welds by standard AWS symbols showing size, length, and type of each weld.
- B. Test Reports: Submit reports for welded connection tests.
- C. Submit anchor setting drawings clearly showing location of all anchor bolts and embedded plates to be anchored in concrete and masonry construction. Provide templates for anchor bolts.

1.03 QUALITY ASSURANCE

- A. Welding:
 - 1. Performed by certified welders in compliance with AWS D.1 Structural Welding Code.
 - 2. Welders shall be duly qualified within the last 12 months in the position in which they are to weld and the qualifications and Specifications for workmanship shall comply with the AWS requirements "AWS Structural Welding Code - Steel."
- B. Certifications:
 - 1. Prior to fabrication or shipment of material to the job site, furnish certification of the Manufacturer of the structural steel that material furnished meets or exceeds requirements of ASTM standards specified or noted on Drawings, for each type of material.
 - 2. Prior to site welding operation, submit welders' written certifications and qualifications, including date of each welder's certification performing work on the Project.
- C. Tolerances: All steel exposed to view shall be architectural steel, and tolerances as a minimum shall comply with section 10 of AISC code of standard practice.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during unloading, storage and erection to avoid damage. Dumping on the ground is not permitted.
- B. Support material stored at the site completely free of the ground, and cover to avoid damage from the elements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Materials shall be new, of uniform quality, suitable and without defects affecting the strength or service of the structure.
- B. Structural Steel Rolled Shapes Including Channels, Angles, Plates, Bars and Rods: ASTM A36 (Fy = 36ksi), unless otherwise indicated.
- C. Steel Pipe: ASTM A53, Type E or S, Grade B (Fy = 35 ksi).
- D. Steel Tube: ASTM A500, Grade B (Fy = 46 ksi).
- E. Bolts: ASTM A307.
- F. Anchor Bolts, Threaded Bar and Anchors: ASTM A36 or A307, Grade A, unless noted otherwise.
- G. Welded Anchors and Shear Connectors: ICC approved, as manufactured by KSM or Nelson. Substitutions must have ICC approval and be of equivalent capacity for the intended use.
- H. Welding Rods: AWS A5.0, E70 series, low hydrogen type.

2.02 FABRICATION

- A. Workmanship and details of construction (except as otherwise indicated or specified) shall be in conformity with applicable articles of the latest AISC Manual, Parts 1 through 4; AISC Specifications; except Section A7 (Design Documents) and Chapter N (Plastic Design); and the applicable building codes. Sections 3.1, 3.4 and 4.2 of AISC code of Standard Practice are specifically excluded from this work.
 - 1. Sections shall be of dimensions, weight and design as indicated, assembled complete at the shop, with base plates and other detailed materials attached.
 - 2. Furnish shims at columns where base plates are shop fabricated to columns.
 - 3. Make connections as indicated or detailed, on the Drawings and the reviewed shop and erection Drawings.
 - 4. Exposed steel shall have smooth, clean surfaces with no identifying trade marks, names etc., exposed to view.
- B. Bolted connections shall be as detailed or shall conform to AISC standard bolted connections with maximum number of 3/4-inch diameter bolts. See Framed Beam Connections Tables II, III, or IV of AISC Manual of Steel Construction.
- C. Where bolt holes in steel members are enlarged to more than 1/16 inch diameter oversize, provide 3/16 inch x 2-1/2 inch x 2-1/2 inch plate washers to steel members with 3/16 inch fillet weld all around.

- D. Loose Steel Lintels: Provide loose structural steel shape lintels for openings and recesses in masonry walls and partitions, as shown. Weld adjoining members together to form a single unit. Provide not less than 4 inch bearing at each side of openings, unless otherwise shown.
- E. Loose Bearing Plates: Provide loose bearing plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.

2.03 SHOP WELDING

- A. Make welds by the electric-arc process.
- B. Grind exposed welds smooth.
- C. Where weld size is not indicated, it shall develop full strength of member and connection.

2.04 SOURCE QUALITY CONTROL

- A. Tests: Where a welded splice is fabricated in beams or columns other than those detailed, fabricator shall have splice connection tested using one of the following methods: magnetic particle, radiographic, or ultrasonic. Testing shall be conducted by an independent testing laboratory and a report submitted to the Architect. The costs of this testing shall be borne by the fabricator.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Verify anchor bolt locations, grouting and elevation of base and setting plates, and other material set by other Trades before commencing Work.
 - 2. Notify Architect of Work set by others which does not comply with specified tolerances. Do not erect material upon such Work until it has been satisfactorily corrected.
 - 3. Start of Work implies acceptance of Work of other Trades affecting structural frame erection.

3.02 ERECTION

- A. Erect Work to the proper lines and levels, plumb and true, and in correct relation to other Work maintain this condition to completion.
- B. Connections:
 - 1. Machine Bolting:
 - a. Fair-up holes with pins to align holes before bolting.
 - b. Ream unfair holes to obtain alignment or drill new holes.
 - c. Enlargement of holes with drift pins or burning of new holes is not permitted.
 - d. Draw bolts up tight after members are aligned and leveled, and set or deform threads to prevent loosening.

2. Welding:
 - a. Welds shall be per AWS standards and procedures.
 - b. Submit certification that welders have passed AWS code qualification tests.
 - c. Refer to Shop Drawings for weld size and dimensions.
 - d. Close joints exposed to weathering with continuous 1/8 inch weather welds.
 - e. Grind smooth exposed welds, but grinding shall not reduce weld strength or required cross section.
 - f. Protect finish material from damage due to welding.
 - g. Remove unsatisfactory welds by chipping or arc air method.
3. Connect members temporarily and align completely before making permanent connections.
 - a. Temporary conditions shall consist of bolts in no less than 1/3 of the holes and in no case less than 3 bolts in any single connection.
 - b. Surfaces in contact shall be thoroughly clean when assembled.
 - c. Provide necessary temporary bracing and guying to align the structure properly for permanent connections, and safely resist erection, dead load and wind stress.
 - d. Take particular care to have the Work plumb and level (maximum slope ratio tolerance 1 to 500 for interior members, 0 to 1000 for exterior members) before making permanent connections.
 - e. Remove bracing and guys only after permanent alignment and assembly and structure is capable of completely sustaining design and temporary construction loads.

- C. Exposed Steel:
 1. Verify the condition of exposed steel after erection.
 2. Exert particular care to provide a neat, accurate installation with members straight and true, corners and edges square, sharp and free from burrs and irregularities, adjacent members perfectly matched and no bolts or rivets exposed.
 3. Remove erection bolts and seats and plug weld and grind holes smooth.

3.03 FIELD QUALITY CONTROL

- A. Field inspections and testing shall be performed by an independent testing and inspection agency in accordance with Section 01 45 00. Refer to general Structural Notes on Drawings for detailed testing requirements.

3.04 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises.

END OF SECTION

SECTION 05 31 00

STEEL DECK

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Increase S and I properties for simple or two span continuous to achieve equivalent load capacity. Minimum allowable diaphragm shear furnished, per ICC report, shall be in accordance with General Structural Notes on Drawings.
 - 2. Sections and properties shall meet AISC Specifications.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop and erection Drawings showing layout, material and fastening methods and each piece to be erected. Note deck welding pattern and physical properties of decking.
- B. Report: Submit ICC report showing diaphragm shear test.

1.03 QUALITY ASSURANCE

- A. Welding: Performed by certified welders in compliance with AWS D.1.3 requirements and procedures for manual shielded metal arc welding.
- B. Certifications:
 - 1. Prior to fabrication or shipment of material to the job site, furnish certification of the manufacturer of the steel decking that material furnished meets or exceeds requirements of ASTM standards specified or noted on Drawings, for each type of material.
 - 2. Prior to site welding operation, submit welders' written certifications and qualifications.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle metal decking in manner which will prevent damage or deformation.
- B. Stack decking stored at the site before erection on platforms or pallets, and suitably protect from the weather.
- C. Exercise special care so as not to damage or overload the decking during the construction period.
- D. Do not use metal decking for storage or as a working platform until the sheets have been welded in position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by Architect or Structural Engineer, subject to conformance with Specification requirements:
 - 1. Consolidated Systems, Inc. www.csisteel.com
 - 2. Metal Deck, Inc.
 - 3. United Steel Deck, Inc. www.njb-united.com/usd.htm
 - 4. Verco Manufacturing, Inc. www.vercodeck.com
 - 5. Vulcraft Division, Nucor Corp. www.vulcraft.com/sc
 - 6. Wheeling Corrugating Division www.wheelingcorrugating.com

2.02 RIBBED DECK

- A. Steel: ASTM A1008, Grade C or ASTM A653, Grade A, having a minimum yield strength as indicated on General Structural Notes on Drawings.
- B. Finish: Galvanized to conform with ASTM A924, Grade 60.

2.03 ACCESSORIES

- A. Provide ridge and valley plates, closures, cant strips, roof sump pans and other accessories where necessary or as shown on Drawings and of same material and finish as steel deck.
- B. Furnish miscellaneous supporting members at openings and edges, as shown on Drawings and as necessary.
- C. Galvanizing Repair Paint: High zinc-dust content paint complying with SSPC Paint 20 (94 percent minimum zinc dust content, dry film, by weight).
- D. Deck Closure Strips: Die-cut EPDM rubber closure strips cut to match profile of roof deck as manufactured by Carrington Specialty Products www.carrington-specialty.com, or equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Erector shall examine subsurfaces to receive Work and report detrimental conditions, in writing, with a copy to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Before proceeding, verify that required inspections of existing conditions have been completed.

3.02 ERECTION - RIBBED DECK

- A. Place deck sheets in accordance with approved erection layout Drawings.
- B. Deck units shall be fabricated to span three or more support spacings, with end laps of at least two inches which shall occur over supports. Male joint of side laps shall engage female joint by at least 5/8 inch.

- C. Openings shown on the erection layout Drawings shall be cut by the deck erector. Openings not shown on the erection diagram, such as those required for stacks, conduits, plumbing vents, etc. shall be cut and reinforced if necessary, by the Trade requiring the openings.
- D. Attach deck to supporting members by fusion welding. Care shall be exercised by the welder in the selection of electrodes and amperage to provide positive welds and prevent high amperage blow holes. Welds shall be made from the top side of the deck with the welder following close behind the placement crew.
- E. Ridge and valley plates, closures, cant strips, roof sump pans and other accessories shall be attached directly to the deck to provide a suitable surface for the application of insulation and/or roofing.
- F. Welding washers are not necessary for ribbed deck of 22 gauge or heavier, or when the bottom rib width equals or exceeds 5/8 inch.
- G. Where washers are required, weld deck to steel framing through 16 gauge welding washers with 1 inch x 3/8 inch puddle welds. Maximum weld spacing shall be as follows unless noted otherwise on the Structural Drawings:
 - 1. End and end laps: 6 inches o.c.
 - 2. Intermediate supports: 6 inches o.c.
 - 3. Edges, perimeter beams and angles parallel to deck flutes: 12 inches on center
 - 4. Opening edges: 6 inches on center
- H. Weld sheets to each other with side seam welds at 12 inches on center.
- I. Deck Closure Strips: Place EPDM rubber closure strips at locations indicated on Drawings to close deck voids. Adhere with manufacturer's recommended adhesive for permanent, heat resistant installation.

3.03 FIELD QUALITY CONTROL

- A. Tests: When required by the Architect, installation of metal decking and welding shall be subject to inspection by a qualified Testing Agency acceptable to Architect, the cost of which will be paid out of the Testing Allowance.
- B. The Testing Agency shall:
 - 1. Test and inspect metal decking and workmanship to verify compliance with Contract Documents.
 - 2. Check material, equipment, procedures, welds, ability of welders.
 - 3. Furnish Architect with a verified report that completed Work conforms with Contract Documents.

3.04 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Metal fabrications, including items fabricated from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems in other Sections of these Specifications. Types of metal items include, but are not limited to, the following:
1. Steel plate sills and wall caps.
 2. Steel plate wall louvers.
 3. Steel angle framed wall vents.
 4. Steel tube framed gates, frames and hardware.
 5. Other items as indicated or required.
- B. Related Sections:
1. Section 05 10 00 – Structural Metal Framing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Drawings for the fabrication and erection of custom steel tube framed gates, wall louvers, and angle framed wall vents.
1. Include plans and elevations at not less than 1 inch to 1'-0" scale, and include details of sections and connections at not less than 3 inches to 1'-0" scale.
 2. Show anchorage and accessory items.

1.04 QUALITY ASSURANCE

- A. Standards: Comply with the following, except as otherwise shown and specified:
1. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."
 2. AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
 3. AWS "Structural Welding Code-Steel."
 4. ASTM A6 "General Requirements for Rolled Steel Plates Shapes, Sheet Piping and Bars for Structural Use."
- B. Qualifications: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.05 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during unloading, storage and erection to avoid damage. Dumping on the ground is not permitted.
- B. Support material stored at the site completely free of the ground, and cover to avoid damage from the elements.

1.06 PROJECT/SITE CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication, where possible, to ensure proper fitting of the Work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Shapes, Plates, Rod, Bars and Bar-size Shapes: ASTM A36.
- B. Steel Pipe: ASTM A501 (Fy = 36 ksi), or ASTM A53, Type E or S, Grade B (Fy = 35 ksi).
- C. Steel Tube: ASTM A500 (Fy = 46 ksi).
- D. Cold-Finished Carbon Steel Bars: ASTM A108, Grade as selected by fabricator.
- E. Cold-drawn Steel Tubing: ASTM A512, sunk drawn, butt welded, cold-finished and stress-relieved.
- F. Welded or Woven Wire Mesh:
 - 1. Provide type, finish, spacing and gauge indicated on Drawings as manufactured by McNichols, or equivalent as approved by Architect.
 - 2. Approved Manufacturers: Provide wire mesh manufactured by one of the following:
 - a. Alabama Metal industries Corporation www.amico-securityproducts.com
 - b. Niles Expanded Metals www.nilesexpandedmetals.com
 - c. McNichols Co. www.mcnichols.com
 - d. McMaster Carr www.mcmaster.com
- G. Standing Seam Metal Panels: As specified in Section 07 61 00.
- H. Gray Iron Castings: ASTM A 48, Class 30.
- I. Malleable Iron Castings: ASTM A 47, Grade 32510.
- J. Anchors:
 - 1. Masonry Anchorage Devices: Expansion shield, FS FF-S-325.
 - 2. Chemical Type Anchors: 2-component chemically curing anchors for concrete or masonry construction, capsule or injection type, designed to accept Manufacturer's galvanized anchor rod.
 - 3. Threaded-type concrete inserts: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts; either malleable iron complying with ASTM A47 or cast steel complying with ASTM A27; hot-dip galvanized in compliance with ASTM A153.
 - 4. Wedge-type concrete inserts: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge-shaped heads, either malleable iron complying with ASTM A47 or cast steel complying with ASTM A27; hot-dip galvanized in compliance with ASTM A153.
 - 5. Provide carbon steel bolts having special wedge-shaped heads, nuts washers and shims; all galvanized in compliance with ASTM A153.

- K. Fasteners: Provide zinc-coated fasteners with galvanizing complying with ASTM A153 for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
 - 1. Bolts and nuts: ASTM A307, Grade A, regular hexagon head.
 - 2. Bolts, hexagon and square: ANSI B-18.2.1.
 - 3. Bolts, round head: ANSI B-18.5.
 - 4. Plain washers: ASTM F844 helical spring type carbon steel.
- L. Metal Primer: As specified in Section 09 91 00 (Primer used only on items specifically indicated to be painted. In general, all steel shall be left exposed).

2.02 ACCESSORIES

- A. Inserts and Anchorages: Furnish inserts and anchoring devices to be set in concrete or built into masonry for installation of Miscellaneous Metal Work. Provide setting Drawings, templates, instructions and directions for installation of anchorage devices.
- B. Closure Strips for Roof Deck: Closure strips indicated to close openings of steel roof deck at fabricated steel angle framed wall vents are specified in Section 05 31 00.

2.03 FABRICATION

- A. General: 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. Remove such blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes, including zinc coatings.
- B. Shop Assembly: Preassemble items in shop, when possible, to minimize field splicing and assembly of units at the site. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Workmanship:
 - 1. Use materials of the size and thickness shown, or if not shown, of the required size and thickness to produce adequate strength and durability of the finished product for the intended use. Work to the dimensions of fabrication and support. Use type of materials shown or specified for various components of Work.
 - 2. Form exposed Work true to line and level with accurate angles, surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the Work.
 - 3. Weld corners and seam continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.
 - 4. Form exposed connections with hairline joints which are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type shown, or if not shown, use Phillips flat-head (countersunk) screws or bolts.
 - 5. Provide for anchorage of type shown, coordinated with supporting structure and the progress schedule. Fabricate as required to provide adequate support for the intended use of the Work.
 - 6. Cut, reinforce, drill and tap Miscellaneous Metal Work as may be required to receive finish hardware and similar items of Work.
 - 7. Use hot-rolled steel bars for Work fabricated from bar stock, unless Work is indicated to be fabricated from cold-rolled, or cold-finished stock.

- D. Steel Plate Sills and Wall Caps: Fabricate steel plate sills and wall caps from steel plate of thickness indicated on Drawings.
1. Provide headed stud anchors welded to plate for embedment in concrete masonry wall construction as detailed on Drawings.
 2. Smooth/ease all exposed edges.
 3. Provide exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
- E. Steel Plate Wall Louvers: Fabricate steel plate wall louvers and frames from bent steel plate and angles of thickness, sizes and configuration indicated on Drawings.
1. Provide headed stud anchors welded to steel plate or angle frame for embedment in concrete masonry wall construction as detailed on Drawings.
 2. Place louver blades at spacing and angle detailed.
 3. Fabricate with continuously welded joints, and smooth exposed edges.
 4. Provide exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
 5. Fabricate bird screens from wire mesh of type scheduled on Drawings welded to steel angle perimeter screen frames as detailed.
 6. Secure bird screens to louvers by welding.
- F. Steel Angle Framed Wall Vents: Fabricate wire mesh wall vents from wire mesh of type and size indicated on Drawings with steel angle frames as detailed.
1. Fabricate vents to sizes and configurations indicated on Drawings for various wall openings.
 2. Provide headed stud anchors welded to angle frames for embedment in concrete masonry wall construction as detailed on Drawings.
 3. Fabricate with continuously welded joints, smooth exposed edges, and mitered corners.
 4. Provide exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
- G. Steel Tube Framed Gates, Frames and Hardware: Fabricate steel tube framed gates and frames from steel tube, plate and angles of sizes and configurations indicated on Drawings.
1. Provide headed stud anchors welded to steel tube frames for embedment in concrete masonry wall construction as detailed on Drawings.
 2. Fabricate wire mesh gate panels from wire mesh of type and size indicated on Drawings.
 3. Fabricate standing seam metal gate panels from standing seam metal panels specified in Section 07 61 00.
 4. Fabricate with continuously welded joints, smooth exposed edges, and mitered corners.
 5. Provide exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
 6. Fabricate steel slide latch from bent steel plate and rod stock as detailed on Drawings.
 7. Hinges: Provide heavy duty steel butt hinges sized as required by size and weight of gate. Weld hinges to frame.
 8. Coordinate fabrication of gates with other hardware specified in Section 08 71 00.

- H. Prevent galvanic action and other forms of corrosion by insulating contact points between metals and incompatible metals or materials. Provide separation of resilient gasket or other appropriate material to separate aluminum bar gratings and angles where units are attached to steel.

2.04 FINISHING

- A. Shop Painting: In general, all metal fabrications and other exposed steel shall be left exposed in the finished work. Shop prime only items specifically indicated on Drawings to be painted.
 - 1. Shop paint only items specifically indicated, except those members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, unless otherwise indicated.
 - 2. Remove scale, rust and other deleterious materials before shop coat of paint is applied. Clean in accordance with SSPC SP-2, SP-3, or SP-7, as required. Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
 - 3. Apply one shop coat of metal primer paint to fabricated metal items, except apply 2 coats of paint to surfaces which are inaccessible after assembly or erection.
 - 4. Immediately after surface preparation, brush or spray on metal primer paint in accordance with Manufacturer's instructions, and to provide a uniform dry film thickness of 2 mils for each coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.
- C. Verify rubber closure strips are in place and securely attached in steel roof deck voids at locations where steel angle framed wall vents are installed.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on Shop Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

- F. Prevent galvanic action and other forms of corrosion by insulating contact points between metals and incompatible metals or materials. Provide separation of resilient gasket or other appropriate material to separate aluminum bar gratings and angles where units are attached to steel.
- G. Touch-up Painting: Touch-up welds, abrasions, and other areas where shop prime paint has been removed or is damaged with specified prime paint or galvanizing repair paint.

3.04 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch

3.05 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Rough carpentry including, but not limited to:
 - 1. Roof sheathing.
 - 2. Plywood utility backer boards.

1.02 QUALITY ASSURANCE

- A. Identify each piece of plywood with grade and trade mark of a lumber grading organization. Trade mark of manufacturer shall also appear on each piece.
- B. Standards: Conform with requirements of The Engineered Wood Association, U. S. Dept. of Commerce Commercial Standards, as they apply.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage: Store off ground to assure adequate ventilation, and protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements: Store materials for which a maximum moisture is specified in areas where humidity can be controlled.

PART 2 PRODUCTS

2.01 SHEATHING MATERIALS

- A. General:
 - 1. Panel thickness and identification index shall be as shown on the Drawings and as specified and shall also be stamped on each piece of sheathing.
 - 2. Design of project is based upon plywood sheathing, however, OSB Board may be substituted for plywood if it conforms to all requirements for plywood installed in like locations.
 - 3. Plywood (or OSB Board where allowed) which has an edge or surface permanently exposed to the weather shall be exterior type.
- B. Plywood: Each panel of softwood plywood shall be identified with the APA grade-trademark and shall meet the requirements of PS-1-83 for softwood plywood.
- C. Plywood Backing Panels: For mounting of telephone and electrical equipment, provide Grade C-D Exposure 1 plywood panels, 15/16 inch thick, unless otherwise indicated.

- D. OSB Board:
1. Raw materials used in panel shall be manufactured from wood products conforming to ANSI A201.1.
 2. Each piece shall be stamped in accordance with American Plywood Associations (APA) grade rules and shall meet requirements of latest edition of U.S. Product standard for Softwood Plywood.
 3. Provide Grade 2-M-W or 2-M-F as required for thickness and application.

2.02 FACTORY WOOD TREATMENT

- A. Fire-Retardant Treatment: Lonza Wood Protection www.wolmanizedwood.com Dricon FRTW, or Hoover Treated Wood Products www.frtw.com, Pyro-Guard; in accordance with UL label.
1. All wood utility backer panels shall be fire-retardant treated.
 2. Dimensioned lumber shall be kiln dried to a maximum moisture content of 18 percent before and after milling and fire protective treatment.

2.03 ACCESSORIES

- A. Screws: Standard domestic manufacture, bright steel, except galvanized for exterior use and of brass, bronze, aluminum or stainless steel when used to attach items made of those materials. Screws used for attaching interior trim and finish to drywall partitions shall be Type S self-drilling, self-tapping corrosion resistant coated steel drywall screws of required lengths as specified in Section 09 29 00.
1. Screws used for attaching preservative treated wood shall be Type S self-drilling, self-tapping corrosion resistant coated steel screws. Acceptable products include the following:
 - a. DEC-KING Exterior Wood Screw with Climacoat.
 - b. Tapcon Concrete Anchor with Blue Climaseal or White UltraShield.
 - c. Wood-To-Metal TEKS with Grey Spex.
 - d. Roofgrip with Spex or Blue Climaseal.
 - e. GY-FAST Nail with Climacoat.
 - f. Maxi-Set Tapcon White UltraShield.
- B. Galvanizing: ASTM A653.

PART 3 EXECUTION

3.01 PLYWOOD SHEATHING

- A. General: Comply with applicable recommendations contained in APA Form No.E30, "APA Engineered Wood Construction Guide," for types of structural use panels and applications indicated.
1. Comply with "Code Plus" of the above-referenced guide.
- B. Securely attach to substrate by fastening as indicated, complying with the following:
1. ICC NER-272 for power-driven fasteners.
 2. IBC Table 2304.9.1, Fastening Schedule."
- C. Sheathing shall have edges blocked and nailed for diaphragm or shear wall stresses as shown on the Drawings.
- D. At non-tongue and groove sheathing, provide plywood clips at 24 inches O.C. maximum at unsupported or unblocked edges.

3.02 PLYWOOD BACKING PANELS

- A. Plywood Backing Panels: Install with the “C” or best face on exposed side.

3.03 CLEANING

- A. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of away from premises.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Architectural woodwork as shown on Drawings and as specified herein, including, but not limited to, the following:
 - 1. Stainless steel clad countertops and supports.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing layout, dimensioned plans and elevations, adjacent conditions, large-scale details, and attachment details. Field verify critical dimensions.

1.03 REFERENCES

- A. Reference Standards: Comply with the following:
 - 1. Architectural Woodwork Standards (AWS), Edition 1.

1.04 QUALITY ASSURANCES

- A. Qualifications: Manufacturer shall be company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage and moisture while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Softwood Lumber (Concealed Locations): Graded in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified, Douglas Fir species, plain sawn, moisture content of 6-8 percent, with flat grain. Thickness as indicated on Drawings.

- B. Softwood Plywood: DOC PS 1, MDO (Medium Density Overlay), or other overlay plywood product suitable for application of plastic laminate as approved by the Architect.
- C. Wood Particleboard: Standard in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified, composed of wood chips, 45 lb. density, made with water resistant adhesive; of grade to suit application; sanded faces for drawer construction and shelving.

2.02 LAMINATE MATERIALS

- A. Stainless Steel Sheet Metal Cladding: AISI Type 304, 16 gauge, complying with ASTM A167, No. 4 satin finish.

2.03 ACCESSORIES

- A. Laminate Adhesive: 3M Fastbond 30, or equivalent to suit application.
- B. Wood Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application. Threaded steel for concealed joints.

2.04 FABRICATION

- A. Exposed fasteners are not allowed in the finish Work on exposed and semi-exposed surfaces.
- B. Shop assemble for delivery to site in units easily handled and to permit passage through building openings.
- C. Stainless Steel Clad Countertops: To the greatest extent possible, fabricate countertop cladding from one piece of stainless steel adhesive applied to 3/4 inch core. Laminate second layer of core material of 4 inch width around edges and 24 inch center to center spacing to form a under frame for rigidity and reinforcement of top as required.
 - 1. Core: Particleboard, MDO Plywood or MDF.
 - 2. Form and wrap stainless steel sheet metal at edges as detailed on Drawings. Hem all edges.
 - 3. Where seams are unavoidable, provide tight fitting hairline joint seams without gap. Provide thin gauge backing sheet at seam and solder. Visible solder on the top surface is not acceptable.
 - 4. Exposed fasteners are not allowed. Exposed fasteners on the countertop underside are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. Set and secure in place; rigid, plumb and level as detailed on Drawings with fasteners and attachment brackets concealed from view.

3.03 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

END OF SECTION

SECTION 07 19 00
WATER REPELLENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Water repellent coating for exposed CMU wall surfaces.

1.02 DEFINITIONS

- A. Water Repellent: Resistant to penetration of water from rainfall.

1.03 SYSTEM DESCRIPTION

- A. Water repellent shall penetrate into and chemically bond with substrate. Treated surface shall resist penetration by water and water-borne salts, ions, and other contaminants for the warranty period specified herein.
- B. Water repellent shall not change surface texture, appearance, or vapor permeability. Slight changes (darkening) of substrates after application are subject to approval by Architect prior to acceptance and general application.
- C. Masonry walls treated with water repellent shall show no evidence of moisture penetration when field quality control tested after application.

1.04 SUBMITTALS

- A. Submit sample of manufacturer's warranty and any special procedures required to obtain warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be able to show evidence that the firm has been engaged in producing such material for at least 5 years and that the product has maintained water repellency for over 5 years of continuous field exposure.
- B. Applicator Qualifications: Applicators shall be trained, approved and accepted by the Manufacturer and have a minimum of 2 years experience in successful application of water repellent products.
- C. Regulatory Requirements: Comply with volatile organic compound (VOC) regulations in effect within the jurisdiction of the Project site.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Delivery shall be made to the job site in Manufacturer's original containers with seals unbroken and labeled with Manufacturer's batch number.
- B. Storage and Protection: Store materials in original, unopened containers in compliance with Manufacturer's printed instructions and protect from damage.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements: Temperature and relative humidity conditions for a period before, during, and after application shall be as recommended by the Manufacturer. If rain occurs, allow surfaces to dry a minimum of 5 days.

1.08 WARRANTY

- A. Manufacturer shall provide a written warranty for a period of 5 years from date of project completion.
1. Written warranty shall include the following provisions:
 - a. Walls where water repellent has been applied shall show no evidence of moisture penetration on the interior surface of the wall for the full warranty period.
 - b. Coating will not cause changes in surface texture and color for the full warranty period, regardless of number of applications required to comply with performance requirements.
 2. Upon satisfactory completion of the installation, and as a condition of its acceptance, the warranty shall be delivered to the Owner.
 3. If at any time during the warranty period, any such failure occurs resulting from ordinary weather conditions in any area to which the coating has been properly applied, the manufacturer shall agree to supply all material needed to repair such affected areas at no additional cost.
- B. The applicator shall guarantee the installation against poor workmanship for a period of 2 years from the date of Substantial Completion. Applicator shall make necessary repairs without charge to Owner during that period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, subject to compliance with Specification requirements:
1. Water Repellent Sealer:
 - a. Chemprobe Coating Systems, L.P.; Division of Tnemec Co., Inc. www.tnemec.com
 - b. Degussa Corporation, www.degussa.com
 - c. ProSoCo., Inc. www.prosoco.com
 - d. Tamms Industries, Inc. (Euclid Chemical Company) www.tamms.com

2.02 MATERIALS

- A. Water Repellent Sealer:
1. Aqua-Trete Concentrate, Degussa Corporation.
 2. Barcade M.E., Tamms Industries, Inc.
 3. WB Concentrate, ProSoCo., Inc.
 4. Prime A Pell H₂O; Chemprobe Coating Systems.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
1. Carefully inspect the installed Work of other Trades, and verify that such Work is complete to the point where water repellent application may commence.
 2. The Manufacturer's representative shall verify that the water repellent can be applied in accordance with the Manufacturer's recommendations.
 3. Verify that cracks which exceed 1/64 inch (0.40mm) wide have been filled with pointing mortar or caulking material. Defective mortar joints shall be routed out, pointed with mortar and tooled.
 4. Verify that flashing and caulking materials have been installed properly.
 5. Verify that masonry has been cleaned as specified in Section 04 01 20.52.
 6. Verify sealants have been installed and are properly cured.
 7. Advise Architect in writing of unsatisfactory conditions. Do not apply water repellent until conditions have been corrected.

3.02 PREPARATION

- A. Protection:
1. Use all means necessary to protect clear water repellent before, during, and after installation and to protect the installed Work of other Trades.
 2. Metal, glass and other such items shall be protected by suitable masking materials to protect against overspray.
 3. In the event of damage, immediately make repairs and replacements necessary as acceptable to the Architect.
 4. Protect concrete sidewalks from runoff by soaking with water immediately prior to application on adjacent walls.
- B. Surface Preparation:
1. Allow walls to cure at least 30 days before clear water repellent is applied.
 2. Walls shall be free of excess mortar.
 3. Follow Manufacturer's instructions regarding allowable moisture level.
 4. Clean surface in accordance with water repellent manufacturer's recommendations to remove all loose and foreign matter that could interfere with application and performance of water repellent.

3.03 APPLICATION

- A. Water Repellent Application - General: Follow Manufacturer's instructions for application and coverage, and procedures established during pre-installation conference.
- B. Mixing:
1. Concentrates: Concentrated products shall be mixed as recommended by the manufacturer for type of substrate where applied.
 2. Strictly observe all mix ratios and consistently measure field mixes with containers calibrated in standard volume units.

- C. Surfaces to be coated:
 - 1. All exposed exterior surfaces of concrete masonry unit walls, including surfaces not exposed to view but left exposed in the finished work such as backs of parapet walls, horizontal projections, etc.
 - 2. Masonry surfaces indicated above which will be covered by another finish material such as paint, etc., do not require application of water repellent.
 - 3. Other locations as indicated on Drawings.

- D. Application:
 - 1. Apply water repellent to dry surfaces using airless spray equipment as recommended by the manufacturer at consistent minimum rate.
 - 2. Apply product in saturating one or two coat application allowing time between coats as recommended by the manufacturer.
 - 3. Apply product from bottom of the vertical surface to the top, saturating the surface until “run-down” is achieved, but avoiding excessive rundown in accordance with manufacturer’s printed instructions.
 - 4. At no time shall rate of coverage be less than required by Manufacturer's written instructions and additional procedures established in the pre-installation conference.

- E. Protect surfaces where water repellent has been applied from rain, dirt, dust, traffic, wind-blown debris and other materials that could harm performance of material for a period of not less than 4 hours after application, but not less than protective time recommended by the manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Water Penetration Tests:
 - 1. Twenty days after completion of this portion of the Work, and as a condition of its acceptance, demonstrate by running water test that the Work of this Section will successfully repel water.
 - 2. Notify the Architect and Manufacturer at least 72 hours in advance and conduct the test in the presence of Architect and manufacturer's representative.
 - 3. By means of an outrigger or similar acceptable equipment, place 3/4 inch garden hose with garden type spray nozzle, at a point designated by the Architect, 8 feet to 10 feet away from the wall, aiming the nozzle so that water will strike the wall at a 45 degree downward angle.
 - 4. Run the water onto the wall at full available force for not less than 4 hours. Provisions shall be made to collect the run off water into a container, and if possible to reuse it in the test
 - 5. Upon completion of the four hour period, inspect the interior surface of the wall for evidence of moisture penetration.
 - 6. If evidence of moisture penetration is discovered, perform corrective procedures recommended by the manufacturer and as established during the pre-installation conference to the areas where leakage occurred.
 - 7. Successful application of water repellent will show no evidence of moisture penetration on the interior surface of the wall after four hour period.
 - 8. An additional area or areas designated by the Architect shall be tested and corrected if leakage occurs, at no additional cost to Owner.
 - 9. Application of water repellent is subject to rejection upon failing field quality control testing after corrective procedures have been performed at areas failing initial field quality control testing.

3.05 CLEANING

- A. Clean spillage and overspray as recommended by the Manufacturer.
- B. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of away from premises.

END OF SECTION

SECTION 07 43 13

METAL ROOF AND WALL PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes metal roof and wall panels of the following types, including associated roof underlayment, flashings, clips, trims, closures and related accessories.
 - 1. Standing seam metal roof panels installed over roof underlayment over plywood sheathing over steel roof deck.
 - 2. Standing seam metal wall panels installed over smooth face CMU wall construction.
 - 3. Structural standing seam panels installed in steel tube framed gates specified in Section 05 50 00.
- B. Related Sections:
 - 1. Division 04 masonry sections for CMU wall construction supporting standing seam metal wall panels.
 - 2. Section 06 10 00 – Rough Carpentry, for plywood roof sheathing underlayment.
 - 3. Division 26 and Electrical Drawings for photovoltaic panels installed on standing seam metal roofing.

1.02 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide metal roof and wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
 - 1. Wind Uplift: Meet or exceed 36.5 psf at 5'-0" span in accordance with ASTM E1592 for panels 18 inches wide x 22-gauge steel.
 - 2. Wind Uplift: UL 580 test, Class 90 rating.
 - 3. Air Infiltration: Panel shall have an air infiltration value of .007 cfm/ft² at a pressure differential of 6.24psf when tested in accordance with ASTM E283.
 - 5. Water Penetration: Panel shall have no leakage at a pressure differential of 6.24 psf when tested in accordance with ASTM E331.
- B. Standing seam metal roof panels shall be designed and installed to accommodate attachment, loads and other accessories of photovoltaic solar panels installed on standing seam metal roof system.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles including attachment clips, and finishes for each type of metal roof and wall panel and accessory, including type of underlayment product indicated.
- B. Shop Drawings: Show layouts of sheet metal roof and wall panels, including plans and elevations. Show clip arrangement, spacing and fastening to meet the specified wind speed requirements.
 - 1. Include details for forming, joining, termination points, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.
- C. Samples: For each exposed finish for verification purposes.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Installer must be approved by the Panel Manufacturer in writing prior to work commencing. Installer shall meet the following:
 - 1. Successfully applied a minimum of five metal roof and wall panel projects of comparable size and complexity which reflects a quality weather tight installation.
 - 2. Have been in business for a minimum period of two years in the region where the work will be performed.
- B. Manufacturer Qualifications: Manufacturer shall have a minimum of 10 years experience supplying metal roof and wall panels similar to type specified herein.
- C. Source Limitations: Obtain metal roof and wall panel through one source from a single manufacturer.
- C. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual and manufacturer's installation guidelines.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.06 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof and wall panel in accordance to manufacturers' written instructions and warranty requirements.

1.07 WARRANTY

- A. Special Weathertightness Warranty: Furnish written warranty for period of 20 years from substantial completion of the Work, on manufacturer's standard form in which manufacturer agrees to repair or replace sheet metal roofing as necessary to maintain roofing Work in watertight condition during the warranty period. Warranty to cover workmanship, materials and repair or replacement of same, at no cost to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
 - 1. AEP-SPAN, Fontana, CA www.aep-span.com
 - 2. ATAS Aluminum Corp., Allentown, PA. www.atas.com
 - 3. Berridge Manufacturing Co., Houston, TX www.berridge.com
 - 4. Metal Sales Manufacturing Company www.mtlsales.com
 - 5. Rollfab Metal Building Products www.rollfabmetal.com

- B. Basis of Design: Products as manufactured by Rollfab Metal Building Products as indicated on Drawings and as specified.

2.02 SHEET MATERIALS

- A. Weathering Steel (Cor-Ten) Sheet: Cor-Ten steel, ASTM A606 and meeting or exceeding the requirements of ASTM A606, Type 4A.
 - 1. Finish: Standard Cor-Ten A finish to be left exposed in the finished work and develop a protective oxide film. After installation, clean exposed surfaces thoroughly to prevent non-uniform weathering.
- B. Unfinished Metal (supporting clips, etc., concealed in the finished work): ASTM A653 Structural Quality, Grade 40, G90 Coating, hot dipped galvanized or ASTM A792 Galvalume.

2.03 UNDERLAYMENT, FASTENERS AND ACCESSORIES

- A. Underlayment: (1) Layer of ASTM D226, No. 30 unperforated asphalt saturated felt.
 - 1. Underlayment Fasteners: Standard galvanized roofing nails with plastic or felt caps, or as approved by the sheet metal roofing manufacturer. Do not use one-piece nail caps.
- B. Butyl Sealant Tape: Pressure-sensitive, polyisobutylene compound sealing tape with release paper backing as recommended by manufacturer.
- C. Sealant: As specified in Section 07 92 00.
- D. Fasteners: Stainless steel or corrosion resistant coated screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Manufacturer shall provide or authorize all fasteners utilized with the sheet metal roofing system.
 - 1. Exposed Fasteners: Heads matching color of sheet metal roofing by means of factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or screws spaced to resist wind uplift loads.
- E. Accessories: Provide components required for complete metal roof and wall assemblies of type indicated including installation clips and fasteners, flashings, trims, ridge closures, sealants, gaskets, fillers, and similar items. Match material and finish of sheet metal roof and wall panels where exposed to view. All trim and flashing components shall be supplied in longest lengths practical but not less than 12'-0", and shall conform to manufacturer's standard part dimensions and details.
 - 1. Fastening clips and anchorage shall be same type and design used in testing of panels.
 - 2. Flashing and Trim: Formed from matching materials as sheet metal roof and wall panel in gauges noted. Provide flashing and trim in heavier gauge materials as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bottom wall drip edge, edge trims, roof eaves, rakes, corners, bases, framed openings, ridges, fasciae, fillers, and other items as required.

2.04 FABRICATION

- A. Standing Seam Metal Roof and Wall Panels – Basis of Design: Rollfab SL-175 standing seam panels as manufactured by Rollfab Metal Building Products or equivalent from one of the specified manufacturers as approved by the Architect.
 - 1. Gauge: 22 gauge.

2. Rib Height: 1-3/4 inches.
 3. Coverage: 18 inches with smooth or striated surface as selected by Architect.
 4. Single piece UL-90 rated clip for thermal expansion and contraction.
 5. Factory applied sealant.
- B. Unless otherwise shown on drawings or specified herein, fabricate panels in continuous one-piece lengths and fabricate flashings and accessories in longest practical lengths.
- C. Panels may be factory formed or field formed.
- D. Flashing and Trim Accessories: Fabricate steel trim accessories to comply with manufacturer's recommendations, SMACNA's "Architectural Sheet Metal Manual", and details on Drawings. Hem all exposed edges.
- E. Coordinate and fabricate panels to accommodate support and attachment of photovoltaic solar panels installed on standing seam metal roof panel system. Provide necessary reinforcements and additional clips and attachments as may be required to support photovoltaic solar panel system and roof supported accessories.
- F. Fabrication Tolerances: Flat metal surfaces will display waviness commonly referred to as "oil canning". This is caused by steel mill tolerances and is a characteristic, not a defect, of panels manufactured from light gauge metal. Panels are factory correctively-leveled to minimize the occurrence of "oil canning". As such, "oil canning" will not be accepted as cause for rejection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
1. Examine metal deck and plywood sheathing underlayment to ensure proper attachment to framing.
 2. Inspect installed plywood sheathing underlayment to verify deck is clean and smooth, free of depressions, waves or projections, properly sloped to valleys and eaves.
 3. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 4. Verify deck is dry and free of snow or ice. Joints in wood deck to be solidly supported and nailed.
 5. Ensure that all fastener heads are totally flush with the substrate.
 6. Field verify measurements prior to fabrication.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work, including photovoltaic solar panels installed on standing seam metal roof panel system.

3.02 UNDERLAYMENT INSTALLATION

- A. Underlayment Installation:
1. Install (1) layer asphalt felt underlayment over entire area to be roofed.
 2. Continue installation from eave to ridge in shingle fashion free of wrinkles.
 3. Install horizontally, with 6 inch minimum weather overlaps and minimum 36 inch end laps.

4. Stagger end laps of each consecutive layer a minimum of 24 inches.
 5. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under sheet metal roofing.
 6. Ensure that all nail heads are totally flush with the substrate.
- B. Ensure installed underlayment is installed horizontally, flat, smooth and free from punctures and tears.
- C. Install sheet metal roofing immediately after installation of underlayment to avoid over exposure from elements and drying of the roof underlayment.
- D. Dry, brittle or wrinkled underlayment shall be removed and new underlayment installed prior to installation of metal roofing.

3.03 INSTALLATION

- A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
- B. Panels:
1. Follow roof panel manufacturer's directions.
 2. Locate and place attachment clips and fasten to supporting construction to comply with manufacturer's written instructions and performance requirements
 3. Place starter trims, tracks and other perimeter flashing with concealed fasteners, plumb, level and in correct alignment with adjoining construction.
 4. Install panel seams vertically.
 5. Do not stretch or compress panel side-lap.
 6. Secure panels without warp or deflection.
 7. Fully engage interlocking seams.
 8. Remove strippable protective film, if any, immediately preceding panel installation.
- C. Allowable Erection Tolerances:
1. Maximum Alignment Variation: 1/4 inch in 40 feet
- D. Flashing:
1. Follow Manufacturer's directions and Architect approved Shop Drawings.
 2. Install flashings to allow for thermal movement
 3. Remove strippable protective film, if any, immediately preceding flashing installation.
- E. Cutting and Fitting:
1. Neat, square and true. Torch cutting is prohibited.
 2. Openings 6 inches and larger in any direction: Shop fabricates and reinforces to maintain original load capacity.
 3. Deburr cut edge where necessary

3.04 CLEANING

- A. On completion of sheet metal roof and wall panel installation, clean finished surfaces, including removing unused fasteners, accessories, pieces of flashing, etc. Maintain in a clean condition during construction.
- B. Do not allow traffic on completed roof. If required, provide cushioned walk boards.

- C. Protect installed roof and wall panels and trim from damage caused by adjacent construction until completion of installation.
- D. Remove and replace panels, flashing and other components that have severe surface damages or blemishes and/or substrate damage or are otherwise damaged beyond successful repair.
- E. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- F. Clean grease, finger marks or stains from the panels per Manufacturer's recommendations to allow even consistent weathering.

END OF SECTION

SECTION 07 92 00

JOINT SEALERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes joints sealants and installation accessories.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Submit Manufacturer's current specifications and recommended installation procedures.
 - 2. Submit sample warranty to be signed jointly by applicator and Manufacturer.
 - 3. Submit Manufacturer's standard color chart.
 - 4. Certification in the form of standard data sheet or letter that each type of compound and sealant to be furnished complies with these specifications.
 - 5. Statement that each product to be furnished is recommended for the application shown for this project.
 - 6. Complete instructions for handling, storage, mixing, priming, installation, curing and protection of each type of sealant.
- B. Field Adhesion Test and Stain Reports: Submit copies of logs and test reports showing results of field adhesion testing and stain testing. In lieu of field adhesion test reports, contractor may provide manufacturer's certification that products are suitable for use indicated based on previous testing and successful use.
- C. Submit three (3) samples of each specified product, 12 inch minimum lengths, and installed between representative samples of materials to be sealed for each product. Architect's acceptance will be for color only.
- D. Certifications: Submit certification signed jointly by Contractor and Sealant Manufacturer, certifying that products comply with specification requirements, are proper and adequate for the condition of installation and use, have been properly selected and designed for applications where they are to be installed, and that sealants and accessory materials have been installed in accordance with Manufacturer's printed instructions and recommendations of Manufacturer's field representative.
- E. Provide a procedure detailing the cleaning, priming, taping, tooling and other steps recommended to ensure satisfactory function and appearance.
- F. Contract Closeout: Submit Manufacturer's Warranty.

1.03 QUALITY ASSURANCE

- A. Qualifications: Installers shall be thoroughly trained and experienced in the necessary skills and shall be thoroughly familiar with the specified requirements.
- B. Field Adhesion Testing: Perform preconstruction adhesion testing for each type of sealant and substrate as follows:
 - 1. Arrange for Manufacturer's field technical representative to be present during testing.
 - 2. Install sealant in test joints in minimum 60 inch lengths.

3. Test joints by standard field adhesion hand pull test.
 4. For joints with dissimilar substrates, test adhesion to each substrate separately as recommended by sealant Manufacturer.
 5. Conduct number of field adhesion tests for each type of sealant and each type of substrate as follows:
 - a. Not less than 10 tests for the first 1,000 feet of installed sealant and 1 test for each additional 1,000 feet of sealant installed, or 1 test per floor per elevation.
 6. Document results of field adhesion tests and record results in field adhesion test log.
 7. Include in log data on pull distance used to test each joint sealant.
 8. Include data on joints where material connected with pull portion of sealant failed to adhere to joint substrate or tore cohesively.
 9. Inspect joints and record data for the following:
 - a. Complete fill.
 - b. No voids.
 - c. Joint dimensions matching those of Manufacturer's recommended details.
 10. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 11. Do not install joint sealants that fail to adhere to joint substrates during testing.
 12. Repair sealant test areas by removing damaged materials and applying sealant to test area using same procedure used to originally install the sealant.
- C. Stain Testing: Perform Stain testing of natural stone, masonry and other porous substrates proposed for use in the Work. Obtain actual samples of materials proposed for use and test to determine if permanent discoloration of porous surfaces will occur from direct contact with sealants. Perform stain testing in conformance with ASTM C1248 and as follows:
1. Arrange for Manufacturer's field technical representative to be present during examination of test results.
 2. Cut substrate to provide flat surface for application of sealant.
 3. Separate substrate materials by removable shims to create 1/2 x 1/2 x 3 inch joint.
 4. Fill joint with scheduled sealant, tool, and allow to cure for 21 days at room temperature.
 5. After 21 day curing, remove shims, compress joint to 50 percent of original joint width to 1/4 inch, and place in an oven at 158 degrees F. for 14 days.
 6. After 14 days in oven, remove and allow sample to cool to room temperature.
 7. Examine sample to determine presence of discoloration or change in appearance in any way to exposed surfaces.
 8. After visual inspection, cut sample in half to determine presence of discoloration or change in appearance in any way into the sample itself at the adhesive bond line and presence of bleeding into the area around the adhesive bond line.
 9. Document results of stain tests and record results in stain test log.
 10. Do not install sealants that show evidence of staining substrates.
- D. Field Color and Workmanship Samples: Seal a section of joint as directed, under job conditions, at least 7 days prior to start of work for review by Architect. When approved, sample shall be used as a standard of comparison for remainder of work.
- E. Manufacturer and sealants Subcontractor to submit log of testing, on company letterhead for each test performed indicating, but not limited to the following:
1. Date
 2. Project identification
 3. Sealant identification including name, type and batch number
 4. Test performance, i.e., acceptable, marginal, not acceptable

5. Storage conditions
 6. Signature of person conducting test
- F. Location where the test was conducted.
- G. If tests indicate sealant material is marginal or not acceptable, sealant is not to be used. Tester is to immediately notify Architect and Contractor of the deficient materials. The sealant Subcontractor is to immediately remove deficient materials from site.
- H. Inspections
1. Coordinate sealant selection and application as necessary for the full and satisfactory compatibility and performance between all sealants used under this section with all other applicable and related sections using sealants that may be in direct contact with work of this section.
 2. Take all required steps and precautions to properly isolate and prevent any degree of incompatibility between sealants, all in strict accordance with Manufacturer's specifications, recommendations and instructions.
 3. Contractor is to periodically test sealants in place in addition to the Manufacturer's field testing, for adhesion, using methods recommended by sealant Manufacturer. Promptly replace all sealant that does not adhere or fails to cure.
 4. Contractor shall arrange to meet the sealant Manufacturer at the jobsite and witness initial installation of sealant on the project with the Contractor, Architect and other Consultants.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site. Maintain product in accordance with Manufacturer's recommendations with proper precautions to ensure fitness of material when installed.
- C. Handling: Comply with Manufacturer's instructions.

1.05 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Observe Manufacturer's temperature service range. Do not apply sealant when weather conditions will inhibit bonding and curing.

1.06 WARRANTY

- A. Provide warranty, in writing and signed jointly by the installer and sealant Manufacturer, to replace sealants which fail at no additional cost to the Owner because of loss of cohesion or adhesion, or do not cure, and which fail to achieve air-tight and water-tight seal as follows:
1. Sealant Types "A" and "B": 5 years.
 2. Sealant Types "C1" and "C2": 20 years.
 3. Sealant Types "D," "E" and "F": 2 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as approved otherwise by the Architect, subject to compliance with specifications requirements:
1. Pecora www.pecora.com
 2. Dow Corning Corp. www.dowcorning.com
 3. General Electric www.ge.com
 4. Sika Corporation www.usa.sika.com
 5. Sonneborn / Chemrex www.chemrex.com

2.02 MATERIALS

- A. General: Sealants, primers, back-up materials, preformed joint fillers, bond breakers and related materials shall be compatible with adjoining materials.
- B. Sealant:
1. General: The selection of proper sealant for a particular joint shall be in accordance with current published recommendations of the Manufacturer.
 2. Types: See Schedule in Part 3 for the location where each type of sealant is to be provided.
 - a. Type "A": Ultra-low modulus, self-leveling, one-component, silicone sealant conforming to ASTM C920, Type S, Grade SL, Class 100/25, Use T, A, M, and O; Dow Corning SL Parking Structure Sealant (Self Leveling), Pecora 300/310 SL, or Tremco Spectrem 900 SL; OR Low-modulus, non-sag, one-component silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 100/25, Use T, A, M, and O. Dow Corning NS Parking Structure Sealant (Non-Sag), Pecora 301/311 NS, or Tremco Spectrem 800; OR Ultra-low modulus, fast-cure, two-component, neutral-cure silicone sealant conforming to ASTM C920, Type S, Grade FC, Class 100/25, Use T, A, M, and O; Dow Corning FC Parking Structure Sealant (Fast Cure).
 - b. Type "B": Silicone sealant conforming to ASTM C920, Type M, Grade NS, Class 25, Use NT, M, A, O, and capable of withstanding movement of 50% in extension and compression, and sustained temperatures of 250 degrees F in service. Dow Corning 790, 795, CCS and CWS.
 - c. Type "C-1": One-part low modulus moisture cure silicone rubber sealant conforming to FS TT-S-005143A, Class A, FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O, and capable of withstanding movement of 100% in extension and 50% in compression in service. Dow Corning 790 Silicone Glazing Sealant or Pecora 890.
 - d. Type "C-2": One-part medium modulus neutral cure silicone rubber sealant conforming to FS TT-S-001543A, Class A, FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O, and capable of withstanding movement of 50% in extension and 50% in compression in service. Pecora 895, Dow Corning 795 or Dow Corning 791 or 756 SMS (non-staining), Sika Sikasil-N Plus US. Provide Dow Corning 756 SMS where sealant with reduced soiling is indicated.
 - e. Type "D": Medium-modulus, single-component, pre-pigmented, neutral-cure silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A, O. Dow Corning 756 SMS Building Sealant, Sika Sikasil WS-295.

- f. Type "E": Silicone rubber sealant with mold inhibitor. General Electric Sanitary 1700, Tremco Tremsil 200, Dow Corning 786, Pecora 898, Sonneborn Omni-Plus.
- 4. Color: Provide standard or custom colors as selected by Architect. In general, colors shall be matching the adjacent materials unless specifically noted otherwise on Drawings.
- D. Primer: Non-staining type, recommended by sealant Manufacturer to suit application.
- E. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant Manufacturer; compatible with joint forming materials.
- F. Joint Filler (Backer):
 - 1. Buildings: ASTM C1330, Type B; round bi-cellular or closed cell polyethylene, urethane or neoprene foam rod; oversized 30 to 50 percent; "SofRod" as manufactured by Nomaco.
 - 2. Pavement: ASTM D5249, Type 3, round bi-cellular or closed cell polyethylene, urethane or neoprene foam rod; oversized 30 to 50 percent; "SofRod" as manufactured by Nomaco.
- G. Bond Breaker: Pressure sensitive tape recommended by sealant Manufacturer to suit application.
- H. Gloss Reducer: Silica sand No. 20, color to match adjacent surface. Gloss reducer shall be provided at traffic sealant applications.
- I. Other Materials: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the sealant Manufacturer as compatible, subject to the review by the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces. Verify, before proceeding with this Work that required inspections of existing conditions have been completed.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 PREPARATION

- A. Clean, prepare, and prime joints in accordance with Manufacturer's instructions. Remove loose materials, dust, oil, grease, water, surface dirt, frost, old caulking material and other foreign matter which may impair adhesion of sealant.
 - 1. Clean porous materials where necessary by grinding, sand or water-blast cleaning, mechanical abrading, acid washing or combination of these methods as required to provide a clean, sound base surface for sealant adhesion. Clean nonporous surfaces, either mechanically or chemically.

2. Remove laitance by acid washing, grinding or mechanical abrading. Remove form oils by sand or water-blast cleaning. Remove all loose particles present or resulting from grinding, abrading or blast cleaning by blowing out joints with oil free compressed air or by vacuuming joint prior to application of primer or sealant.
 3. Remove protective coatings from metallic surfaces by two rag solvent wipe method. Use clean white cloths or lint free paper towels for cleaning with solvent and drying. Clean joint areas protected with masking tape or strippable film with solvent after removal of tape or film. Do not allow solvent to air dry without wiping.
- B. Verify that joint shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve required width/depth ratios.
1. Joint widths, depths, and conditions detailed on shop drawings by related work contractors shall be considered as minimum allowable requirements except where they may conflict with sealant Manufacturer's recommendations. In all cases, joints must be uniform in width. Do not seal joints until they are in compliance with drawings, or meet the accepted control section standard. Notify general Contractor and Architect of Conditions not compliant with Drawings or acceptable standards.
 2. Clean out and rake to full width and depth, joints to receive sealant, back-up material or preformed joint filler. Make joints of sufficient width and depth to accommodate specified back-up material or preformed joint filler and sealant.
- D. Use joint filler to achieve required joint depths, to allow sealants to perform properly.
- E. Use bond breaker where required.
- F. Protect adjacent surfaces from damage by masking when necessary.

3.03 INSTALLATION

- A. General:
1. Install sealant in accordance with Manufacturer's instructions.
 2. In general, seal openings and other locations which normally require sealant to seal against infiltration from air, water and most insects, including; but not limited to:
 - a. Construction and expansion joints.
 - b. Joints between dissimilar materials.
 - c. Joints around windows, door frames, louvers and other penetrations and openings in the exterior wall.
 - d. Interior wall openings.
 - e. Other locations indicated on drawings.
 3. Follow sealant Manufacturer's instruction regarding surface preparation, priming, application life, and application procedure. Consult sealant Manufacturer for recommendation for application procedure. Apply sealant within recommended temperature ranges. Consult Manufacturer when sealant cannot be applied within recommended temperature ranges. Consult sealant Manufacturer for recommendation for application of silicone sealant when air temperature is below 40 degrees F., or surface temperatures of sealant contact surfaces are above 115 degrees F.
 4. Apply masking tape, where required, in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled as directed. Sealant on face of adjacent stone or other materials will not be acceptable.

- B. Joints shall be free of air pockets, foreign embedded matter, ridges, and sags.
 - 1. Tool joints concave.
- C. Apply sealant under pressure with hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed.
- D. Neatly point or tool joint surfaces to provide slightly concave surfaces, free of wrinkles and skips, uniformly smooth and with perfect adhesion along both sides of joint. All joints to be “Dry tooled”. Do not use water-wet tool or tooling solutions.
- E. Sealant applied to joints adjacent to mortar joints shall be sanded to achieve texture similar to that of adjacent mortar joint.
- F. Consult sealant Manufacturer regarding the proper method of installing back-up material or joint filler at proper depth in joint to provide specified sealant dimensions. Compress back-up material 25 to 50 percent into the joints as required. Do not apply sealant without back-up materials. Install bond breaker strip between sealant and non-release type back-up material. Three side adhesion is acceptable only for the sealing at joinery of members that are to be rigidly attached to each other by means of screws or welding restricting all movement.
- G. Install back-up rod stock into the joint to avoid length-wise stretching. Rod stock shall not be twisted or braided. Use bond breaker strip in all joints where sufficient room for back-up does not exist.
- H. Surfaces of joints to be sealed must be dry. Do not attempt sealant work on wet surfaces or where frost is present. Consult sealant Manufacturer regarding the procedures for determining acceptable surface conditions.

3.04 CLEANING

- A. Clean adjacent surfaces of sealant as work progresses.
- B. Use solvent or cleaning agent as recommended by sealant Manufacturer.
- C. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

(Continued)

3.05 SCHEDULE

- A. Expansion and Control Joints:
 - 1. Horizontal traffic: Type "A" with gloss reducer.
 - 2. Joints around exterior windows and doors, exterior columns, louvers, masonry, concrete to concrete, steel, wall penetrations, connections, parapet caps, other joints to seal off building from exterior air and moisture: Type "B".
 - 3. Glass (except insulating glass or special coated glass), aluminum, E.I.F.S., Natural Stone, and plastics: Type "C-1".
 - 4. Glass (including insulating glass or special coated glass), aluminum and plastics: Type "C-2".
 - 5. Masonry and Painted Metals: Type "D".

- B. Non-expanding Joints:
 - 1. Glass (except insulating glass or special coated glass), aluminum, E.I.F.S., Natural Stone, and plastics: Type "C-1".
 - 2. Glass (including insulating glass or special coated glass), aluminum and plastics: Type "C-2".
 - 3. Masonry and Painted Metals: Type "D".
 - 4. Concrete to concrete, masonry, aluminum, steel, and wood: Type "C-1".

- C. Plumbing Fixtures and other Wet Areas (around toilet, bath, kitchen fixtures, and food service equipment): Type "E".

END OF SECTION

SECTION 08 11 13
STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes hollow metal steel doors and frames as shown on Drawings and as specified herein.
- B. Related Sections:
 - 1. Section 08 43 13 – Aluminum Framed Storefronts, for aluminum storefront frames where steel doors are shown to be installed in aluminum frames.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing elevations of each door and frame type, typical and details of construction, location and installation requirements for hardware, size and thickness of material.
- B. Furnish recognized independent test lab certification that products comply with ANSI A250.4.

1.03 DELIVERY AND STORAGE

- A. Deliver welded frames with spreaders and doors with wrappers.
- B. Store doors and frames under protective cover in dry, enclosed spaces at the site. Place doors and frames on non-staining blocking Raise bottoms of doors at least 4 inches high and provide 1/4 inch air space between stacked doors to avoid metal to metal contact and permit air circulation.

1.04 QUALITY ASSURANCE

- A. Doors and frames shall be certified to comply with ANSI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing, and ANSI A250.8, Recommended Specifications for Standard Steel Doors and Frames.

1.05 WARRANTY

- A. Special Warranty: Furnish the following warranty to Owner:
 - 1. Warrant doors against defects in materials and workmanship for a period of 3 years after date of substantial completion of Project.
 - 2. Replacement under warranty shall include removal of the defective door and hardware, hanging, re-installation of hardware, and painting including adjacent finishes if damaged.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish steel doors and frames from one of the following Manufacturers, except as otherwise approved by the Architect, subject to compliance with Specification requirements:
1. Steelcraft Manufacturing Co. www.steelcraft.com
 2. Curries Company www.curries.com
 3. The Ceco Corporation www.cecodoor.com
 4. The Kewanee Corp. www.kewaneecorp.com
 5. Republic Builders Products www.republicdoor.com
 6. Fleming Steel Doors and Frames www.flemingdoor.com
- B. Doors and frames shall be furnished by the same Manufacturer, except where doors are installed within aluminum storefront frames specified in Section 08 43 13.

2.02 MATERIALS

- A. Doors: Furnish Level, Model and Physical Performance level in accordance with ANSI A250.8.
1. Level: Level 2, 18 gauge at interior doors and Level 3, 16 gauge at exterior doors, or as otherwise scheduled or indicated on Drawings.
 2. Physical Performance: Level B at interior doors and Level A at exterior doors, or as otherwise scheduled or indicated on Drawings.
 3. Model: Model 2, Seamless.
- B. Cores: Polyurethane.
- C. Frames: ANSI A250.8, 16 gauge steel at interior frames with 18 gauge doors and 14 gauge steel at exterior frames with 16 gauge doors.
- D. Glazing Beads: Minimum 20 gauge steel.
- E. Steel: ASTM A1008 cold-rolled or ASTM A1011 hot-rolled. Hot-dip galvanized meeting ASTM A653, Grade G60, or Grade A60 galvanized for exterior openings.
- F. Rain Drips: Reese A201 A, or equal my Pemko or National Guard.
- G. Paint: Non-lifting, rust-inhibitive grey primer meeting ANSI A224.1, compatible with field finish specified in Section 09 91 00, applied after bonderizing.

2.03 FABRICATION- DOORS

- A. Construct hollow metal doors, flush and vision lite types as scheduled on Drawings, in accordance with ANSI A250.8 with core as specified above. Reinforce top and bottom of doors horizontally by 16 gauge steel channels, full width, spot welded to each face at least 3 inches on center. Bevel edge of lock stile.
1. Door Top Edge: Close top of all doors flush as an integral part of the door construction, or by placing end closure channel with web of channel flush with top edge of door (not inverted), or by addition of end cap at top of door, spot welded to each face at least 3 inches on center, filled and dressed smooth.
 2. Door Bottom Edge: Close bottom edges of all exterior doors with inverted end closure or end cap to provide channel to accept concealed automatic door bottom or seal.

- B. Door Edge Joint and Treatment: Joints at the edges of doors shall have manufacturer's standard edge construction with continuously welded seam, dressed smooth.
- C. Hardware Reinforcement: Provide steel plate reinforcement of the following minimum thickness fabricated from steel of same material as door faces. Coordinate with hardware schedule:
 - 1. Hinges: 7 gauge by 1-1/2 inch by length of hinge plus 6 inches minimum, securely welded to door edge with a minimum of 6 spot welds.
 - 2. High Frequency Hinges: 12 gauge channel, full length of door edge.
 - 3. Lock Faces and Flush Bolts: 12 gauge steel plate. Provide reinforcement at each door face for locks.
 - 4. All Other Surface Mounted Hardware: 12 gauge steel plate.
- D. Reinforce openings in doors for lites and vents on all sides with 14 gauge steel channel.
- E. Provide continuous drip cap at top of all exterior out-swinging doors.
- F. Provide non-egress double doors with one-piece astragals of 14 gauge steel unless otherwise indicated or scheduled. Provide solid drip cap at top of exterior out-swinging doors.
- G. Accurately mortise doors for locks and hinges. Provide adequate box type reinforcement with steel plates welded to the interior reinforcing channels and drilled and tapped. Provide reinforcement for all other items of hardware.
- H. Doors with glass lite openings shall have trim recessed from the face of the door, beveled and attached with screws.
- I. Louvers: Provide sightproof louvers inserted into the panels. Form louver frames of minimum 20-gauge steel. Weld or tenon minimum 24 gauge blades to frame and fasten the entire assembly to the door with moldings. The moldings, when used, shall be an integral part of the louver.

2.04 FABRICATION - FRAMES

- A. Construct to shapes and sizes shown, meeting various wall thicknesses in accordance with ANSI/SDI-250.8.
- B. Fully Welded Frames: Continuously weld, fill, grind and dress smooth face frame miters. Continuously back-weld casing, stop, soffit and rabbet.
- C. Mortise, reinforce, drill and tap for standard weight, full mortise template hinges and template strike.
- D. Provide not less than three 18 gauge anchors per jamb, or as shown on Drawings, spaced for maximum stiffness. Provide adjustable 18 gauge floor clips at each jamb, welded to back face of jamb, punched for securing to floor with two spaced anchors.

- E. Make cutouts for required hardware specified under Section 08 71 00, from templates furnished. Reinforce butt cutouts with minimum 8 gauge thick steel plate drilled and tapped and welded in place. When heavy duty hinges are specified, provide high frequency reinforcing at frames for hinges. Coordinate with hardware vendor. Provide strike stops of frames with holes for three rubber door silencers; on double door frames, provide for two silencers per door at head.
 - 1. Hardware Reinforcement: Provide steel plate reinforcement of the following minimum thickness fabricated from steel of same material as frames. Coordinate with hardware schedule:
 - a. Hinge Cutouts: Reinforce hinge cutouts with 7 gauge high frequency steel plate drilled and tapped and fully welded in place top and bottom. 7 gauge at intermediate locations.
 - b. Strikes and Flush Bolts: 12 gauge.
 - c. Surface Mounted Hold-Open Arms and Closers: 7 gauge
 - d. Exit Devices and Corner Reinforcement: 12 gauge
- F. For openings over 42 inches wide and at double openings, reinforce head members full length with a matching profile of 12 gauge steel. Provide anchor at midpoint of door, if practical.
- G. Rain Drips: Provide rain drip at all exterior hollow metal door frames at exposed exterior walls whether scheduled in hardware sets or not.

2.05 FABRICATION TOLERANCES

- A. Allowable Tolerances for Fabrication: As specified in ANSI/SDI-117, Manufacturing Tolerances Standard Steel Doors and Frames.

2.06 PAINTING

- A. Bonderize and prime doors and frames with one shop coat of rust inhibitive primer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install metal door frames plumb, level, rigid and in true alignment as recommended in SDI 105 and ANSI/DHI A115.IG, and the following:
 - 1. Cross Site Reveal: Not to exceed 3/16 inch as measured against stop of installed frames and doors. Doors and frames exceeding maximum allowed cross site reveal shall be removed and replaced at no additional expense to Owner.
- B. Install doors and fasten to maintain alignment with frames to achieve maximum operational effectiveness and appearance.
 - 1. Maintain clearances as specified in ANSI A250.8, 2.1.8.
 - 2. Shim as required per NFPA 80, ANSI/A115.IG and SDI 122.
- C. Fill backs of frames solid with mortar at concrete and masonry construction.
- D. Prepare and install doors in accordance with ANSI A115 and SDI 122.

3.02 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

END OF SECTION

SECTION 08 43 13

ALUMINUM FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes aluminum storefront frames.
- B. Related Sections:
 - 1. Section 08 11 13 – Steel Doors and Frames, for hollow metal doors installed in aluminum storefront frames.
 - 2. Section 08 71 00 - Door Hardware
 - 3. Section 08 80 00 – Glazing

1.02 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Window wall framing system shall provide for flush retained glazing on all sides without projecting stops, with glass set in the center of the frame.
 - 2. Framing system shall be suitable for outside or inside glazing.
 - 3. System shall be either screw spline, shear block or a compensating/stick system.
- B. Performance Requirements: Window wall.
 - 1. Limit air leakage through assembly to 0.06 CFM/min/sq. ft. of wall area at 6.24 PSF as measured in accordance with ASTM E283.
 - 2. Water leakage: None, when measured in accordance with ASTM E 331 with a minimum static test pressure of 8 psf.
 - 3. Limit deflection to L/175 with a maximum of 3/4 inch when subjected to 25 psf wind load design pressure acting inward and outward.
 - 4. System shall not deflect more than 1/8 inch at the center point of a horizontal member, or more than 1/16 inch at the center of members located directly above operable doors and windows, once deadload points have been established.
 - 5. System shall accommodate expansion and contraction movement due to surface temperature differential of 180 degrees F.
 - 6. Seismic requirements shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.

1.03 SUBMITTALS

- A. Submit product data, shop drawings and samples in accordance with Section 01 33 00.
 - 1. Product Data: Submit 2 copies of Manufacturer's Specifications, recommendations and standard details for aluminum doors, frames and components of the Work. Include manufacturer's installation manual.
 - 2. Shop Drawings:
 - a. Include wall elevations at 1/2 inch scale, and full-size detailed sections of every typical composite member.
 - b. Show anchors, joint system, expansion provisions, end dams, water diverters and other components not included in Manufacturer's standard data.
 - c. Include glazing details.

3. Samples:
 - a. Submit 3 samples of each required aluminum finish on 12 inch long extrusions or 6 inch square sheets of the alloys to be used for the Work.
 - b. Where normal color and texture variations are to be expected, include 2 or more units in each Sample, to show the range of such variations.
 - c. Samples will be reviewed by Architect for color and texture only.
 - d. Architect reserves the right to require samples of typical fabricated sections, showing joints, exposed fastenings (if any), quality of workmanship, hardware and accessory items, before fabrication of the Work proceeds.

1.04 QUALITY ASSURANCE

- A. Standards: Except as otherwise indicated, the requirements for aluminum doors and frames, and the terminology used in this Section, are those of NAAMM, AAMA and AA and in particular, those of the "Entrance Manual" by NAAMM.

1.05 PROJECT/SITE CONDITIONS

- A. Field Measurements:
 1. Whenever possible, check the actual openings in the construction Work by accurate field measurement before fabrication, and show recorded measurements on final shop drawings.
 2. Coordinate fabrication schedule with construction progress as directed and avoid delays of the Work.
 3. Where necessary, proceed with fabrication without field measurement, and coordinate installation tolerances to ensure proper fit of units.

1.06 WARRANTY

- A. Warrant entire system of aluminum entrance doors and frames against leaks or other defects for a period of two (2) years.
 1. Defective materials and workmanship are hereby defined to include, but are not limited to, evidence of:
 - a. Penetration of water into the building through fixed glazing and framing components.
 - b. Air infiltration exceeding specified limits.
 - c. Structural failure of components resulting from forces within specified limits.
 - d. Failure of insulated glass units.
 - e. Cracking, crazing, flaking, of coatings or opacifiers on glass.
 - f. Secondary glass damage and/or damage due to falling components.
 - g. Adhesive or cohesive failure of sealant.
 - h. Crazing on surface of non-structural sealant.
 - i. Non-structural sealant hardening beyond Shore A durometer 50 or softening below 20.
 - j. Failure of operating parts to function normally.
- B. Warrant aluminum finish against excessive fading, excessive non- uniformity of color or shade, cracking, peeling, pitting or corroding (all within the limits defined). Warranty shall include replacement at no charge (material and labor) for a period of five (5) years beginning on the date of final acceptance.
- C. Upon notification of defects within the warranty period, make the necessary repairs and replacements at the convenience of the Owner. Repairs and replacements shall include resultant damage to adjacent materials, systems and equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as otherwise approved by the Architect, subject to compliance with specifications requirements:
1. Arcadia, Inc. www.arcadiainc.com
 2. EFCO. www.efcocorp.com
 3. Kawneer Co. www.kawneer.com
 4. Oldcastle Building Evelope www.oldcastleglass.com

2.02 MATERIALS

- A. Framing members, transition members, mullions, adapters, and mountings: Extruded 6063 T5 aluminum alloy (ASTM B221 - Alloy G.S. 10aT5).
- B. Screws, miscellaneous fastening devices, and internal components: Aluminum, stainless steel, or zinc plated steel in accordance with ASTM B633. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum.
- C. Glazing Gaskets: Neoprene or EPDM and silicone compatible. PVC glazing gaskets are not acceptable.
1. Exterior: Cellular sponge, 40 +/- 5 Shore A durometer, complying with ASTM C509, with molded corners.
 2. Interior: Non-cellular dense, 75 +/- 5 Shore A durometer, complying with ASTM C864, option 1 or 2, with molded corners.
 3. Bed all gasket corners, molded or not in elastomeric silicone sealant.
- D. Steel Sections: ANSI/ASTM A36; shaped to suit mullion sections.
1. Shop prime all steel components with zinc oxide, alkyd primer, high-solids content, conforming to SSPC-Paint 25.1.
- E. Glass: As specified in Section 08 80 00.
- F. Sealant: Silicone sealant in accordance with Section 07 92 00.
- G. Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25.1.
- H. Touch-Up Primer for Galvanized Steel Surfaces: SSPS 20, zinc rich type.

2.03 COMPONENTS

- A. Sizes and Profiles: The required sizes for doors and frame units, and profile requirements, are shown.

2.04 FABRICATION

- A. General:
1. Weld by methods recommended by the Manufacturer and AWS to avoid discoloration at welds.
 2. Grind exposed welds smooth and restore mechanical finish.
 3. Remove arises from cut edges and ease edges and corners to a radius of approximately 1/64 inch.
 4. Conceal fasteners, wherever possible, except as otherwise shown.

5. Maintain continuity of line and accurate relation of planes and angles.
 6. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members.
 7. Reinforce the Work as necessary for performance requirements, and for support to the structure.
 8. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion.
 9. Separate metal surfaces at moving joints with non-metallic separators to prevent "freeze-up" of joints.
- B. Frames:
1. Fabricate tubular assemblies as shown, with either welded or mechanical joints in accordance with Manufacturer's standards, with concealed fasteners wherever possible.
 2. Provide members of the size, shape, and profile shown.
 3. Reinforce internally with steel channel shapes as necessary to support the required loads. Secure vertical steel at head and sill as necessary for structural performance.
 4. Weatherstripping: Provide compression weatherstripping on door-contact face of door stops on exterior door frames and/or other frames where indicated.
 5. Glass framing members shall provide for flush glazing with through sight lines, without projecting stops for glass thicknesses noted on drawings or as specified in Section 08 80 00.
 6. Provide glazing system for frames to receive lights. Design system for replacement of glass.
 7. System shall provide resilient settings for glass by use of elastomeric extrusions as required to provide specified performance. PVC glazing gaskets are not acceptable.
 8. Fabricate frame assemblies for exterior walls with flashing and weeps to drain penetrating moisture to exterior.
 9. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.
 10. Allow for thermal expansion of exterior units.
 11. Include flashings in conjunction with components as detailed, finished to match.
- C. Hollow Metal Doors: As specified in Section 08 11 13.
- D. Flashings and Miscellaneous Trim:
1. Provide interior sills, exterior sill (or subsills) with end dams, closures, flashings, break metal covers, trim and other elements in conjunction with or adjacent to storefront system as required for watertightness and aesthetics. If sill frame does not provide means for conducting water out of the aluminum frame systems, then suitable flashings to ensure that water is conducted out of system shall be provided. Provide water diverters at ends of the horizontal mullion glazing pockets to drain water down the vertical mullion/hamb glazing pockets to sill can or flashing.
 2. Fabricate miscellaneous trim from 0.060-inch-thick minimum aluminum (break metal) finished to match other components, except fabricate interior and exterior sills(or subsills) from 0.075-inch-thick minimum extruded aluminum (unless the sill or subsill is supporting the weight of the system and then a 0.125-inch thick minimum extruded aluminum shall be provided).
 3. Flashings and sill can, in conjunction with mechanically fastened end dams and/or water diverters shall direct water entering the system to the outside of the building and shall not depend solely upon sealants.

- E. Hardware Installation at Factory: Coordinate with Section 08 11 13.
 - 1. Cut, reinforce, drill and tap frames as required to receive hardware except do not drill and tap for surface-mounted items until the time of installation at the Project Site. Comply with Hardware Manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
 - 2. Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operations, and for delivery and installation of the Work at the Project Site.

- F. Aluminum Finishes:
 - 1. Prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and standards of the finisher or processor.
 - 2. Process components of each assembly in a manner to attain complete uniformity of color.
 - 3. Finish: Dark bronze anodized, Architectural Class 1 anodic coating conforming to Aluminum Association Designation AA-M-12 C22 A42/44.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.

- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. Comply with Manufacturer's Specifications and recommendations for the installation of aluminum entrance and storefront frames.
 - 1. Coordinate installation with installation of hollow metal doors installed within aluminum framed storefronts.
 - 2. Furnish necessary material, labor, and equipment for the complete installation of the following: glass framing, vertical and horizontal mullions, transitional members connecting these components, adapters and mountings for trim moldings and facing materials.
 - 3. Set units plumb, level and true in line, without warp or rack of frames, doors or panels.
 - 4. Shim and brace aluminum system before anchoring to structure.
 - 5. Anchor securely in place, allowing for required movement, including expansion and contraction.
 - 6. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
 - 7. Set sill members and other members in a bed of compound as shown, or with joint fillers or gaskets as shown to provide weathertight construction.

- B. Comply with Section 07 92 00 for sealants, compounds, fillers and gaskets to be installed integrally with aluminum entrances and storefronts.
 - 1. Seal joints in aluminum entrance and storefront in a concealed manner, unless exposed sealant is indicated.
 - 2. Seal perimeter members as shown on Manufacturer's installation instructions or as required for unique job conditions. Set other members with internal sealants and baffles as called for in Manufacturer's installation instructions.

3. Coordinate installation of perimeter sealant and backer materials between assemblies and adjacent construction in accordance with requirements of Section 07 92 00.
- C. Comply with Section 08 80 00 and Aluminum Storefront Manufacturers printed instructions for installation of glass shown to be glazed into aluminum framed storefront.
- D. Dimensions indicated are based on an assumed design temperature of 70 degrees F. Take into account the ambient temperature range at the time of fabrication and erection.
- E. Cut and trim component parts of the aluminum entrance and storefront during erection only with the approval of the manufacturer or fabricator and in accordance with his recommendations. Do not cut through reinforcing members. Restore finish completely to protect material and remove evidence of cutting and trimming. Remove and replace members where cutting or trimming has impaired strength or appearance.
- F. Do not erect members which are warped, bowed, deformed or otherwise damaged to such extent as to impair strength or appearance. Remove and replace members damaged in the process of erection.

3.03 CLEANING

- A. Clean aluminum surfaces promptly after installation of frames, exercising care to avoid damage of the protective coating.
- B. Remove excess glazing and sealant compounds, dirt, and other substances.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Hardware and related items for interior and exterior doors, other than specified in specific door sections.

1.02 SYSTEM DESCRIPTION

- A. Performance Requirements: The Manufacturer or Authorized Distributor shall confirm that there is an established local agency which stocks a full complement of parts and offers service during normal working hours for the finish hardware to be furnished and that the agency will supply parts without delay and at reasonable cost.
- B. Furnish hardware items of proper design for use in doors and frames of the thicknesses, profile, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information in the Contract Documents.

1.03 SUBMITTALS

- A. Submit shop drawings and product data of each type of hardware required for Project, in accordance with Section 01 33 00. Indicate the following:
 - 1. Style and finish.
 - 2. Locations and mounting heights of each item of hardware. Use established numbering system.
 - 3. Include a complete listing of equipment and materials including manufacturer, catalog number, finish, diagrams, (including cut-sheets), schematics and all other pertinent data.
- B. Templates: Supply to Door and Frame Manufacturer(s) to enable proper and accurate sizing and locations of cutouts for hardware.
- C. Certification: At the completion of installation, certify that material is properly installed according to Manufacturers printed instructions.
- D. Operating and Maintenance Data: Submit in accordance with Section 01 77 00. Provide Owner with Manufacturer's parts list and maintenance instructions for each type of hardware supplied and necessary wrenches and tools required for proper maintenance of hardware.

1.04 QUALITY ASSURANCE

- A. Standards: Comply with the following:
 - 1. UL Standard 305 - Panic Hardware.
- B. Regulatory Requirements:
 - 1. Comply with the following:
 - a. ANSI A117.1, 2009 "Accessible and Usable Buildings and Facilities."
 - c. 2010 ADA Accessibility Guidelines (ADAAG).

2. Hardware listed or furnished shall meet requirements of Federal, State and Local codes having jurisdiction.
 3. Any item furnished or installed that does not meet code requirements shall be removed and proper items substituted at no additional cost or expense to the Owner.
 4. Hardware on all doors leading to or from electrical rooms, mechanical rooms, service stairs, dock areas and the like which represent a hazard to the blind, shall have knurling or abrasive coating on the door lever, handle, or bar which will alert the user to potential perils present. The hardware product and installation shall satisfy all governing handicapped codes.
- C. Supplier Qualifications:
1. Employ an AHC member of the DHI.
 2. Factory authorized stocking distributor of the approved items.
 3. Holder of legally required licenses.
- D. Manufacturer Qualifications: 5 years experience in manufacture of comparable systems.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Package each item of hardware in original and individual containers, complete with all necessary fastenings, keys, instructions, and templates for spotting mortising tools.
1. Mark each container with its item number corresponding to the item number on the finish hardware schedule.
 2. Containers holding locks shall show the following corresponding to that shown on the finish hardware schedule:
 - a. Heading number
 - b. Door number
 - c. Hand of door (when required)
 - d. Keying symbol (developed by Owner)
 3. A typewritten schedule in DHI format conforming with the approved schedule shall accompany each shipment.
- B. When hardware must be installed at the factory, the hardware supplier shall send all such needed items to the respective supplier for their use in installation. The cost of this shipping requirement shall be borne by the hardware supplier.
- C. Acceptance at Site: Upon delivery of the finish hardware to the job site, check in and sign for all material delivered and thereafter be responsible for same.
- D. Storage and Protection: Provide a secured area with sufficient space and shelving in which to store and inventory all materials under lock and key. Protect hardware from damage at all times.

1.06 WARRANTY

- A. Warranty hardware against defects in materials and workmanship for 2 years. Repair, replace or otherwise correct deficient materials at no additional cost to Owner.
1. Locksets: 10 year warranty.
 2. Closers: 30 year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products equaling or exceeding quality requirements of the specified product as manufactured by the following are acceptable:
1. Butts: Hager www.hagerhinge.com , Ives: us.allegion.com , Stanley www.stanleyhardware.com , McKinney www.mckinneyhinge.com .
 3. Locksets: Schlage us.allegion.com.
 4. Closers: LCN us.allegion.com
 5. Thresholds, Door Bottoms, Weatherstripping: Pemko www.pemko.com , Hager www.hagerhinge.com , National Guard www.ngp.com, Zero International www.zerointernational.com
 6. Stops, Kickplates, Pulls, Push Plates: Ives us.allegion.com , Trimco www.trimcobbw.com , Hager www.hagerhinge.com.
- B. To the greatest extent possible, obtain all finish hardware of the same type of item from only one Manufacturer.

2.02 HARDWARE

- A. General:
1. Provide items as listed in schedule complete to function as intended.
 2. Manufacture hardware supplied for metal doors or jambs to template and secure with machine screws.
 3. Where cylindrical locks are used in hollow metal doors, furnish lock reinforcing in the door at the time of manufacture.
 4. Furnish finish hardware with all necessary screws, bolts, or other fastenings of suitable; size and type to anchor the hardware in position for heavy use and long life, and of compatible material and finish.
 5. Furnish fastenings with anchors according to the material to which it is applied, and as recommended by the Manufacturer.
 6. Furnish hardware fastened to concrete with machine screws and tampins.
 8. For surface mounted closer, pivot hinges, concealed closers or holders or other hardware mortised into the top or bottom edges, edges shall be a minimum of 4-1/2 inches, thoroughly kiln-dried hardwood.
- B. Finishes: US 26D (626), satin chrome, and US 32D (630), satin stainless steel, unless scheduled otherwise.
- C. Butt Hinges:
1. Determine correct clearance from the Drawings.
 2. Provide non-removable pins on exterior outswinging doors and reverse bevel interior locked doors.
 3. Doors with closers shall have ball bearing butts.
 4. Flat button, top and bottom tips required.
 5. Butt Hinge Length: As recommended by Manufacturer.
 6. Number of Butt Hinges Required: As recommended by Manufacturer.
- D. Door Locks and Latchsets: Types, series, designs, functions and finishes as listed in hardware sets.
1. Design shall permit removal of cylinder without removing lock from door.
 2. Provide locks and latchsets with 2-3/4 inch backset unless otherwise noted.
 3. Provide strikes with extended lip where required to protect trim from being marred by latch bolt.
 4. Provide wrought boxes with strikes.

- E. Door Closers:
 - 1. Surface mounted without covers, finish sprayed to match other hardware.
 - 2. Bodies to be close grained malleable iron, with 3 separate control valves (including backcheck) ANSI Grade 1 or aluminum, ANSI Grade 1.
 - 3. Closer to be equipped with size adjustment (1 through 6) in the field by the installer.
 - 4. Equip closers mounted on wood or mineral core doors with conventional fasteners unless the manufacturer of the closer recommends sex nuts and bolt because of the apparent frequency use of the closer. In the event the door is indicated to be UL-rated, the sex nuts and bolts shall be UL approved.
 - 5. Closers to be installed on interior of door.
 - 6. Provide EDA arms for parallel applications.
 - 7. Provide type as listed in sets.
- I. Kickplates and Armorplates: Size as listed. Provide .050 inch thick stainless steel with No. 4 finish, edges ground smooth.
- K. Stops and Bumpers: Wall type WC9XT shall be used when possible. Locate wall bumpers to prevent lockset lever or closer from touching wall. Walls to receive proper backing for wall bumpers as specified in Section 06 10 00 - Rough Carpentry.
- L. Silencers: At metal frames; 3 at each jamb of single doors, 2 at each jamb of double doors. Not required on doors having weatherstrip or seals.
- M. Flushbolts: As listed in hardware sets.
- N. Weatherproofing, Smoke Seals and Door Bottoms:
 - 1. Continuous at head and jamb of exterior doors; continuous smoke seals at head and jamb of corridor doors.
- O. Thresholds: Sized for opening; to meet handicapped conditions. Provide as detailed on Drawings, or as listed in hardware sets.
- P. Knox Box: Model 3200-R, 4"W x 5"H x 3-1/4" deep with 7"W x 7"H flange, black polyester powder coat finish.

2.03 KEYING

- A. Door Locks: Provide small format interchangeable core type cylinders that are factory master-keyed to integrate into the owner's existing key system.
- B. Supply 3 keys for each lock.
- C. Supply additional keys in following quantities:
 - 1. 3 master keys.
 - 2. 1 grand master keys.
 - 4. 12 construction keys.
 - 5. 2 control keys and 15 extra cylinder cores.
- D. Permanent keys will not be made available to the General Contractor or any Subcontractor or Supplier under any circumstances.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine conditions under which finish hardware will be installed. Report deficiencies to the Architect.

3.02 INSTALLATION

- A. Install hardware in accordance with Manufacturer's recommendations, using proper templates.
- B. Maintain ANSI standard mounting heights for doors, from finished floor to center line of hardware item.
- C. Knox Box: Recessed into wall construction and rigidly anchored in place at locations indicated on Drawings in accordance with requirements for Fire Department access.

3.03 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

3.04 SCHEDULES

HW SET: 01

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
3	EA	SILENCER	SR60 SERIES (AS REQ'D BY FRAME MAT'L)	GRY	IVE
1	EA	ROLLER BUMPER	WS402CCV OR RB471 AS REQ'D	626	IVE

HW SET: 02

2	EA	CONT. HINGE	700	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	SET	PERM. CORE(S)	1C7-2 (MATCH OWNER'S KEYSYSTEM)	626	BES
2	EA	SURFACE CLOSER	4111 CUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142A	628	ZER
1	SET	WEATHERSTRIP	429A (1 @ DW, 2 @ DH)	628	ZER
1	EA	ASTRAGAL	43STST	630	ZER
2	EA	DOOR SWEEP(S)	8198AA	628	ZER
1	EA	PANIC THRESHOLD	65A SSMS/LA	719	ZER

HW SET: 03

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	SET	PERM. CORE(S)	1C7-2 (MATCH OWNER'S KEYSYSTEM)	626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	RAIN DRIP	142A	628	ZER
1	SET	WEATHERSTRIP	429A (1 @ DW, 2 @ DH)	628	ZER
1	EA	DOOR SWEEP(S)	8198AA	628	ZER
1	EA	PANIC THRESHOLD	65A SSMS/LA	719	ZER

HW SET: AL-01

2	EA	CONT. HINGE	112HD	628	IVE
1	EA	ENTRANCE LOCK	ND53HD RHO	626	SCH
1	EA	DOOR BOLT	B680	626	SCH
			Mount in Top Leaf		
			Bolt into Bottom Leaf		
1	SET	PERM. CORE(S)	1C7-2 (MATCH OWNER'S KEYSYSTEM)	626	BES
1	SET	PERIMETER SEAL	FRAME MFR STD	TBD	B/O
1	SET	OVERLAPPING ASTRAGAL	DOOR MFR STD	TBD	B/O
1	EA	DOOR SWEEP	DOOR MFR STD	313	B/O
1	EA	THRESHOLD	FRAME MFR STD	313	B/O
2	EA	ROLLER BUMPER	WS402CCV OR RB471 AS REQ'D	626	IVE

HW SET: G-01

1	EA	INSTITUTION LOCK	L9082HD 06A	626	SCH
1	SET	PERM. CORE(S)	1C7-2 (MATCH OWNER'S KEYSYSTEM)	626	BES
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4111 EDA SRI	689	LCN

A) BALANCE OF HARDWARE BY GATE MFR.

HW SET: G-02

A) ALL HARDWARE BY GATE MFR

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials shall provide continuity of building enclosure vapor and air barrier.
 - 1. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Glass thickness indicated is minimum and shown for detailing only. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with IBC Chapter 24, as measured in accordance with ANSI/ASTM E330.
- C. Limit glass deflection to 1/175 or flexure limit of glass, with full recovery of glazing materials, whichever is less.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's Product Data for glass units, including the following:
 - 1. Structural, physical and environmental characteristics.
- B. Samples: Submit samples as follows:
 - 1. Two samples 8 x 8 inch in size, illustrating glass units, coloration and design.

1.03 QUALITY ASSURANCE

- A. Standards:
 - 1. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 2. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- B. Regulatory Requirements:
 - 1. Conform to IBC Chapter 24, to local requirements and to State law.
- C. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual, and Laminators Safety Glass Association - Standards Manual for Glazing Installation Methods.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Materials: Furnish products of one of the following Manufacturers, except as otherwise approved by the Architect, subject to compliance with Specification requirements:
1. Guardian Industries. www.guardian.com .
 2. Oldcastle Glass Group. www.oldcastleglass.com .
 3. Pilkington LOF. www.pilkington.com .
 4. PPG Industries www.ppgideascales.com
 5. Viracon. www.viracon.com.

2.02 GLASS MATERIALS

- A. Monolithic Glass: PPG Solarbronze, ASTM C1036, Class 2 tinted, Quality q3 glazing select; 1/4 inch thick minimum. Provide ASTM C1048, Kind FT fully tempered conforming to ANSI Z97.1 where indicated on Drawings or required by Code; 1/4 inch minimum. Performance requirements as follows:
1. Visible Light Transmittance: 25 percent.
 2. Total Solar Energy Transmittance: 50 percent.
 3. Visible Light Reflectance: 6 percent.
 4. Total Solar Energy Reflectance: 6 percent.
 5. U-Value:
 - a. Winter Night Time: 1.02.
 - b. Summer Day Time: 0.93.
 6. Shading Coefficient: 0.73.
 7. Solar Heat Gain Coefficient: 0.63.
 8. LSG: 0.84.

2.03 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness tested for compatibility with glazing sealant, minimum length 4 inches, sized per GANA guidelines.
- B. Spacers: Neoprene or EPDM blocks of 65+5 Shore A durometer hardness, designed to maintain positioning of glass and prevent shifting of glass in the glazing pocket and tested for compatibility with specified glazing sealant.
- C. Glazing Gaskets: Neoprene or EPDM and silicone compatible, non-cellular dense, 75 +/- 5 Shore A durometer, complying with ASTM C864, option 1 or 2.
1. Bed all gasket corners, molded or not in elastomeric silicone sealant.
- D. Interior Glazing Compound: Polymerized Butyl Rubber and Inert Fillers (pigments), solvent based with minimum 75 percent solids, non-sag consistency, tack-free time of 24 hours or less, paintable non-staining.
- E. Exterior Glazing Compound: Conforming to ASTM C920, Type S, Grade NS, Use G. Compound shall be paintable, or colored to match frame.
- F. Glazing Tape: Preshimmed 10 percent solids, non-shrinking, butyl rubber tape compatible with sealants. If exposed, tape shall be paintable, or colored to match frame.

2.04 MARKINGS

- A. Tempered glass shall have each light permanently etched with Manufacturer's name and his compliance with ANSI Z-97.1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Examine framing or glazing channel surfaces, backing, removable stop design, and conditions under which glazing is to be performed.
- C. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. Comply with combined recommendations of Glass Manufacturer, aluminum frame manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are shown or specified.
- B. Clean the glazing, channel, or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate.
- C. Do not attempt to cut, seam, nip, or abrade glass which is tempered or heat strengthened.
- D. Comply with "Glazing Manual" by GANA, except as shown and specified otherwise by Manufacturers of glass and glazing materials.
- E. Inspect each piece of glass immediately before installation, and discard those which have observable edge damage or face imperfections.
- F. Install setting blocks of proper size at quarter points or eighth points but at no time closer than 6 inches from the end of the horizontal frame in a bead of clear silicone sealant.
- G. Provide spacers inside and out, and of proper size and spacing, for glass sizes larger than 50 united inches. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width.
- H. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
- I. Gasket Glazing:
 - 1. Fabricate gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
 - 2. Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in the glazing system.
 - 3. Insert gasket between glass and frame or fixed stop, securely in place.

3.03 EXTERIOR COMBINATION METHOD (TAPE AND SEALANT)

- A. Clean contact surfaces with solvent.
- B. Cut glazing tape to proper length and set against permanent stops, 3/16 inch below sightline. Weld corners together by butting tape and dabbing with sealant.
- C. Apply bed of sealant along exterior void ensuring full contact with glass.
- D. Place setting blocks at 1/4 points or eighth points, but at a minimum 6 inches from the near edge of block to edge of glass.
- E. Rest glass on setting blocks and push against tape (and heel bead of sealant) with sufficient pressure to ensure full contact and adhesion at perimeter.
- F. Install removable stops, spacer strips inserted between glass, and applied stops at 2-foot intervals, 1/4 inch below sightline. Place glazing tape on glass with tape flush with sightline.
- G. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass but not more than 3/8 inch below sightline.
- H. Apply cap bead of sealant along exterior void, to uniform and level line, flush with sightline. Tool or wipe cap bead surface with solvent for smooth appearance.

3.04 INTERIOR COMBINATION METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to proper length and install against permanent stop, projecting 1/16 inch above sightline.
- B. Place setting blocks at 1/4 point or eighth points, but at a minimum of 6 inches from the near edge of block to edge of glass.
- C. Rest glass on setting blocks and push against tape with sufficient pressure to ensure full contact and adhesion at perimeter.
- D. Install removable stops; spacer strips inserted between glass and applied stops at 2 foot intervals, 1/4 inch below sightline.
- E. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
- F. Neatly trim off excess tape to sightline.

3.05 ADJUSTING

- A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in any other way during the construction period, including natural causes, accidents and vandalism.

3.06 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Remove labels after Work is completed.

3.07 PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of crossed streamers to framing held away from glass.
- B. Do not apply markers of any type to surfaces of glass.

END OF SECTION

SECTION 09 77 33

FRP WALL PANELS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's Specifications and installation instructions for each material and accessory.
- B. Submit Manufacturer's full range of color and pattern samples of wall panels and trim pieces for Architect's selection. Submit two samples of selected products.
- C. Submit cleaning and maintenance instructions in accordance with Section 01 77 00.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials clearly labeled to identify Manufacturer, brand name, quality or grade and fire hazard classification.
- B. Store horizontally in original undamaged packages.

1.03 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Install materials when temperature and humidity conditions approximate conditions that will exist when building is occupied.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the specified Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements.
 - 1. Crane Composites, Inc. (Kemlite), Channahon, IL (800) 435-0080 www.kemlite.com
 - 2. Marlite, Inc., Dover, OH (303) 343-6621 www.marlite.com

2.02 MATERIALS

- A. FRP Panels: Fiberglass reinforced plastic panels complying with the following:
 - 1. Class: Class I (A) FR panels.
 - 2. Thickness: 0.090.
 - 3. Texture: Embossed texture.
 - 4. Color: White, unless otherwise indicated on Drawings or selected by Architect.
- B. Adhesive for panel installation: Manufacturer's recommended type for use with selected materials, waterproof, mildew resistant nonstaining type.
- C. Edge Sealant: Type "E" clear mildew resistant silicone sealant as specified in Section 07 92 00, or mildew resistant sealant recommended by manufacturer for sealing panel edges and moldings.

- D. Moldings: All molding shall be 1-piece vinyl of the following types, color to match FRP.
 - 1. Panel Edges: "J" type Cap molding.
 - 2. Panel to Panel: "H" type Division Bar molding.
 - 3. Inside Corner: "J" type Inside Corner molding with radius edge.
 - 4. Outside Corner: "J" type Outside Corner molding with extended leg.
 - 5. Ceiling: "J" type Ceiling molding with radius edge, or use inside corner molding.
- E. Fasteners: Manufacturer's standard nylon drive pins.
- F. Miscellaneous Items: Furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation whether or not specified or indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Examine substrate and conditions under which the material is to be installed.
 - 2. Verify that surfaces, when tested with moisture meter, have proper moisture content.
 - 3. Verify that nails and screws are recessed, with joints and depressions taped, finish and sealed.
 - 4. Remove contaminants from areas to be covered.
 - 5. Do not proceed with Work until Work of other Trades which passes through wall covering has been completed and unsatisfactory conditions have been corrected.
 - 6. Start of Work indicates acceptance of responsibility for performance and any required remedial Work.

3.02 INSTALLATION

- A. Install panels in accordance with Manufacturer's printed instructions using full sheet mastic coverage method plus nylon fasteners.
- B. Make joints with 1/8 inch space for expansion and use moldings designed for each condition for the Project.
- C. Bevel back edges of panels with block plane to permit proper fit into moldings.
- D. Place a continuous bead of sealant in the receiver channel of all moldings immediately prior to installation of FRP panels. Place continuous bead of sealant at all edges and tool to smooth, slightly concave shape.
- E. If one end of panel must be mechanically fastened, do not fasten the other end.
- F. Remove plumbing escutcheons, switchplates, wall plates, and surface-mounted fixtures, and cut wall paneling evenly to fit. Replace items after completion of Work.
- G. Where applicable, install paneling before installation of plumbing, casings, bases, cabinets and other items to be applied over paneling.

3.03 CLEANING

- A. Remove excess adhesive and smudges with soft cloth and mineral spirits.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes painting as specified and as noted on Drawings.
1. In general, all exposed exterior and interior surfaces are to be left exposed in the finishes work and do not require painting, except as specifically indicated on Drawings.
 2. Painting includes, but is not limited to the following:
 - a. Utility backer panels specified in Section 06 10 00.
 - b. Steel doors and frames specified in Section 08 11 13.
 3. The following products, materials and fabrications are not to be painted, unless otherwise indicated on Drawings:
 - a. Exposed concrete.
 - b. Interior and exterior exposed masonry surfaces.
 - b. Structural steel framing.
 - c. Steel roof deck.
 - d. Fabricated steel gates.
 - e. Fabricated steel wire mesh wall vents.
 - f. Fabricated steel plate wall louvers.
 - g. Steel plate sills and wall caps.
 - h. Stainless steel countertops and supports.
 - i. Metal roof and wall panels (weathering steel to be left exposed for natural weathering in the finished work).
 - j. Aluminum storefront frames.
 - K. Hardware.
 - L. FRP panels.
 - M. Signage.
 - N. Toilet compartments.
 - O. Toilet accessories.
- B. Related Sections:
1. Section 07 19 00 – Water Repellents, for water repellent coating applied to all exposed CMU wall construction.
 2. Section 09 96 23 – Anti-Graffiti Coatings, for anti-graffiti coating applied to all exterior exposed masonry and steel surfaces as indicated.

1.02 DEFINITIONS

- A. Touch-Up: Painting of items missed by painter at no additional cost to Owner.
- B. Re-Paint: Repairs to paint work for damages caused by other trades.
- C. Properly Painted Surfaces: Surface that is uniform in appearance, color, and sheen, and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, splatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet minimum under normal lighting conditions and from normal veiling position (MPI(a), PDCA P1.92).

- D. Damage Caused by Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
- E. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

1.03 SUBMITTALS

- A. Product Data: Submit schedule of manufacturers of products required for the Work, together with specifications recommended by each manufacturer.
- B. Samples: Submit samples of each type of finish specified.
 - 1. Architect will furnish Contractor a color schedule of colors selected either from manufacturer's stock colors or specially requested color mixes before Work is begun.
 - 2. Submit two 8 inch x 10 inch samples of each color, including the correct sheen and texture, on heavy cardboard or masonry. Submit sealer and stain finishes on material of the same quality and species of wood on which that particular finish shall be used. Rejected samples shall be resubmitted until approved.
 - 4. Samples shall be submitted at least 30 days prior to the start of painting work. Label and identify each sample as to location and application. Upon submittal of color samples, minor variations or changes in color selection may be requested by the Architect and new samples ordered, until final color approval.

1.04 QUALITY ASSURANCE

- A. Standards: Preparation, application and workmanship shall be in accordance with manufacturer's recommendations and applicable provisions of the following:
 - 1. Master Painters Institute (MPI) Architectural Painting Specification Manual.
- B. MPI Grade: All work shall be performed in accordance with MPI Premium Grade finish requirements.
- C. Design Criteria: Systems specified are in addition to prime coats provided under other Specification Sections of the Project Manual.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's sealed original containers with Manufacturer's original legends and labels intact on each container. Deliver amount of materials necessary to meet Project requirements in single shipment.
- B. Storage: Store materials in a single location.
 - 1. Adequately protect against damage while stored at site.
 - 2. In no case shall the amount or method of materials stored exceed the amount permitted or the manner allowed by local ordinances, state laws, or fire underwriter regulations.
 - 3. Keep storage area clean and rectify any damage to area at completion of work of this Section. Maintain storage area at 55 deg. F minimum.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not apply exterior paint in damp or rainy weather or until after the surface has dried thoroughly from the effects of such weather.
 - 1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product.

2. Do not apply varnish or paint when temperature is below 50 degrees F.. Avoid painting surfaces exposed to hot sunlight.
3. During interior application, maintain minimum temperature of 65 degrees F. unless otherwise directed by Architect or manufacturer's printed instructions. Hold temperature as constant as possible.
4. Provide adequate ventilation at all times so the humidity cannot rise above the dew point of the coldest surface to be painted.
5. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted. Inspection of painting work shall take place under same lighting conditions as application. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in Article 1.02 of this Section and the MPI Architectural Painting Specification Manual.

1.07 MAINTENANCE

- A. Extra Materials: Provide painting materials in Manufacturer's original containers with originals labels intact, in each color and or sheen used. Upon completion of the Work, furnish Owner with one fresh gallon of each type and color of paint and finish used on this Project, including primers and undercoats used. Label containers with manufacturer's name, batch, date, color name, anticipated shelf life, mixture instructions, and cautions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as otherwise approved by Architect, subject to compliance with specification requirements.
 1. Benjamin Moore www.benjaminmoore.com
 2. Dunn-Edwards Corporation www.dunnedwards.com
 3. Frazee Paint Company www.frazeepaint.com
 4. Glidden Professional (ICI) www.gliddenprofessional.com
 5. PPG www.ppg.com
 6. Sherwin Williams www.sherwin-williams.com
 7. Tnemec www.tnemec.com

2.02 MATERIALS

- A. Materials used for any painting system shall be from a single manufacturer, unless approved otherwise in writing by painting system manufacturer. Include such approvals in Product Data submittal.
- B. Provide materials in accordance with the Schedule of Paint Products at the end of this Section as applicable to project. Contractor shall provide either waterborne or solventborne products at contractor's option and as follows:
 1. Waterborne:
 - a. Provide where low odor and fast dry are desired.
 - b. Non-blocking materials shall be used for doors, door jambs, railings and other locations subject to handling, or where surfaces will come into contact with other painted surfaces or belongings.
 2. Solventborne:
 - a. Provide where harder finish is required (such as "wet" areas) and odor will not create problems with occupants.
 - b. These products shall not be used where color retention is a concern. Verify with Architect.

3. Materials used shall comply with applicable Federal and local air pollution regulations, lead content laws, and current VOC requirements. If products listed in Schedule of Paint Products located at the end of this Section are not in compliance with regulations, laws, or requirements, Contractor shall notify Architect and shall provide information regarding substitute products.
- C. Basic painting materials such as linseed oil, shellac, turpentine, thinners, driers, and other similar products, shall be of highest quality, pure, be compatible with other coating materials, made by reputable, of manufacturer's listed or listed in MPI manuals, and have identifying labels on containers. Paint materials shall be factory fresh.
- D. Alternate materials submitted for prior approval shall have qualities and materials equal to the other listed manufacturer's scheduled, top of the line, first quality products. Materials selected for coating systems for each type of surface shall be the products of a single manufacturer.
- E. Standard Gloss Range: Provide paints in accordance with the following MPI standard ranges as measured in accordance with ASTM D523, and as indicated on the drawings:
- | <u>MPI Gloss and Sheen Standards</u> | <u>Gloss @ 60°</u> | <u>Sheen @ 85°</u> |
|---|--------------------|--------------------|
| Gloss Level 1 – traditional matte finish – flat | max. 5 units, and | max. 10 units |
| Gloss Level 2 – high side sheen flat – 'velvet-like' finish | max. 10 units, and | 10-35 units |
| Gloss Level 3 – traditional 'eggshell-like' finish | 10-25 units, and | 10-35 units |
| Gloss Level 4 – 'satin-like' finish | 20-35 units, and | min. 35 units |
| Gloss Level 5 – traditional semi-gloss | 35-70 units | |
| Gloss Level 6 – traditional gloss | 70-85 units | |
| Gloss Level 7 – a high gloss | more than 85 units | |
- F. Paints shall be ready mixed except for field catalyzed coatings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Before beginning work of this Section, examine and test subsurfaces to be painted or coated for adhesion of painting and coating systems. Report in writing to Architect conditions that will adversely affect adhesion of painting and coating work. Do not apply painting and coating systems until such adverse conditions are corrected by party responsible for adverse conditions. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

3.02 PROTECTION

- A. Before painting, remove hardware, accessories, electrical plates, lighting fixtures and similar items and protect.
1. Provide "Wet-Paint" signs and other barricades and protections as required to protect adjacent surfaces and work of other trades, whether being painted or not.
 2. Mask permanent labels.
 3. Provide, distribute, and maintain a sufficient supply of clean drop cloths and other protective coverings.

4. Protect foliage and other exterior finished surfaces from contact with cleaning materials and thoroughly flush with water after contact.
5. On completion of each space, replace above items.
6. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.

3.03 SURFACE PREPARATION

- A. General: Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting/coating system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
1. Surfaces requiring painting or finishing shall be thoroughly dry and cured, free of dirt, dust, rust, stains, scale, mildew, wax, grease, oil, deteriorated substrates, bond-breakers, efflorescence and other foreign matter detrimental to the coating's adhesion and performance. Repair voids, cracks, nicks and other surface defects with appropriate patching material. Finish flush with surrounding surfaces and match adjacent finish texture.
 2. Spot prime marred or damaged shop coats on metal surfaces with appropriate metal primer.
 3. Do not perform exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting.
- B. Wood:
1. Sandpaper in direction of grain to smooth and even surface, leaving no sanding marks, and then dust off. After primer coat has been applied, thoroughly fill nail holes, minor holes, cracks and other surface imperfections with putty tinted with primer. Bring putty flush with adjoining surfaces. Sand woodwork between coats to a smooth surface. Cover knots and sap streaks with a thin coat of shellac, or seal with a suitable stain blocking sealer.
 3. Backpriming: Backprime interior woodwork, which is to receive paint or enamel finish, with enamel undercoater paint.
- C. Steel and Iron:
1. Remove grease, oil, mill scale, rust and rust scale and touch-up chipped or abraded places on items that have been shop coated. Remove and reprime incompatible or damaged shop applied primers. Comply with the Steel Structures Painting Council's (SSPC) recommendations for cleaning of uncoated steel and iron surfaces.
 2. When area will be exposed to view, sandpaper the entire primed area smooth, feather the edge of surrounding undamaged prime coat and spot prime in a manner to eliminate evidence of repair.
- D. Galvanized Metal and Aluminum:
1. Thoroughly clean by wiping surfaces with a non-hydrocarbon solvent that will not leave an oily residue. Apply surface conditioner or vinyl-wash pretreatment as required for proper adhesion if required by paint manufacturer. Prime galvanized metal with galvanized iron primer as recommended by paint manufacturer. A test sample of the complete painting system should be applied and checked for adhesion before final painting begins.
 2. Clean visible portions of throats of galvanized steel ductwork with solvent; wipe dry with clean rags and paint flat black.

3.04 WORKMANSHIP

- A. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer, but not less than as specified for each paint system.
- B. Apply each coat of paint evenly and comply with manufacturer's drying time before applying subsequent coats.
- C. Touch up suction spots after application of first finish coat.
- D. Finished work shall be uniform, match approved color, texture and coverage, and free from runs, sags, clogging or excessive flooding. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping. Where varnishes or enamel is used, lightly sand, dust and clean undercoats to obtain a smooth finish coat. Sand carefully between each coat with fine sandpaper as necessary to produce even, smooth surfaces and to provide proper adhesion of subsequent coats.
- E. Where clear finishes are required, ensure tinted fillers match wood. Work fillers well into the grain before set. Wipe excess from the surface.
- F. Where specific mil thicknesses are required, check thickness by the following methods:
 - 1. Over ferrous metal - Elecometer Film Gauge
 - 2. Other surfaces - Tooke Dry Mil Inspection Gauge
- G. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.05 APPLICATION

- A. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied, at no additional cost to the Owner, to completely hide base material, provide uniform color and to produce satisfactory finish results.
- B. Apply coatings without thinning except as specifically required by label directions, or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
- C. Priming will not be required on items delivered with prime or shop coats, unless otherwise specified, or if shop applied prime coat is not compatible with specified painting system. Touch up prime coats applied by others as required to ensure an even primed surface before applying finish coat.
- D. Plumbing, Mechanical and Electrical: Paint only as directed by Architect or specifically indicated on Drawings.
- E. Paint items fitted with finish hardware after hardware has been temporarily removed.
- F. Brush, wipe or roll stain in 2 coat application. Avoid lap marks by maintaining "wet-edge" continually being merged with existing liquid coverage and stop only at natural edges, turns and breaking places.
- G. Do not paint over Underwriters' Laboratory labels, fusible links, exposed sprinkler heads and other similar items.
- H. Paint piping, electrical or other equipment, conduit, vents and other similar items, on roof or other exterior locations as directed by Architect.

3.06 ADJUSTING

- A. Correct deficiencies in workmanship required to leave surfaces in conformance with 'Properly Painted Surface' as defined in this Section.

3.07 CLEANING

- A. During the course of the Work and upon completion of work, remove misplaced paint and stain spots or spills from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of this Section from premises. Leave Work in clean condition acceptable to Architect and Owner.
- B. Remove oily rags and waste daily, taking precaution to prevent fire.

3.08 SCHEDULES

- A. Color Schedule:
 - 1. Architect will provide a complete schedule of colors. Colors may be selected from various manufacturer's color palettes. Manufacturer supplying paint shall match these colors. Contractor shall prepare duplicate set of samples of treatments for major surfaces. If a specific surface or item receiving a paint finish does not have a specific color indicated or selected by the Architect, obtain clarification from the Architect. Do not assume the confirmation of the same color on the adjacent surfaces.
 - 2. Final coat of paint shall not be applied until colors have been approved by the Architect.
- B. Schedule of Finishes: Refer to the "Finish Schedule" on the Drawing for designated finishes of areas.
- C. Finishing of the following listed items and materials will not be required and shall be protected, except where explicitly specified otherwise:
 - 1. Stainless Steel, brass, bronze, copper, nickel, monel metal, chromium, anodized aluminum; specially finished articles such as porcelain enamel, plastic coated fabrics, and baked enamel, unless otherwise indicated.
 - 2. Finished products such as ceramic tile, glass, stone and stone tile, resilient flooring, acoustical ceiling tiles, panels and suspension systems.
 - 3. Pre-finished products such as wood folding partitions and doors, wood casework, bleachers and elevator cabs.

3.09 EXTERIOR PAINT FINISHES

- A. This schedule uses the generic names listed in the Schedule of Paint Products.
- B. System 101 (Ferrous Metals): Not Used.

(Continued)

- C. System 102 (Galvanized Metals): Apply to exposed galvanized metal such as steel doors and hollow metal frames.
 - 1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment (if required by paint manufacturer).
 - 2. 1st Coat: Galvanized Metal Primer.
 - 3. 2nd Coat: Same material as 3rd coat as recommended by manufacturer.
 - 4. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) unless noted otherwise.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).

- D. System 103 (Aluminum): Apply to exterior louvers and other miscellaneous exposed exterior unfinished aluminum surfaces (As directed by Architect, if any).
 - 1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment.
 - 2. 1st Coat: Aluminum Primer.
 - 3. 2nd Coat: Same material as 3rd coat as recommended by manufacturer.
 - 4. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) (if noted on Drawings) Sheen shall be less than 10% per a 85 degree gloss meter.
 - b. Semi-Gloss unless noted otherwise. Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).

- E. System 104 (Concrete Masonry Units):
 - 1. Refer to Section 07 19 00 "Water Repellents" for water repellent coating applied to all exterior and interior exposed concrete masonry unit wall construction.
 - 2. Refer to Section 09 96 23 - Anti-Graffiti Coatings, for anti-graffiti coating applied to all exterior concrete masonry unit wall construction.

- F. System 105 (Concrete and Stucco): Not Used.

- G. System 106 (Exterior Wood): Not Used.

- H. System 107 (Exterior Gypsum Board): Not Used.

- I. System 108 (Sealer - Masonry Parapet Top Surfaces): Not Used.

3.10 INTERIOR PAINT FINISHES

- A. This schedule uses the generic names listed in the Schedule of Paint Products.

- B. System 201 (Ferrous Metals): Apply to exposed metals such as steel doors and hollow metal frames.
 - 1. 1st Coat: Ferrous Metal Primer (Red or White color as applicable to finish coats).
 - 2. 2nd Coat: Same material as 3rd Coat as recommended by manufacturer.
 - 3. 3rd Coat:
 - a. Eggshell: Enamel, Eggshell.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss.
 - c. Gloss (if noted on Drawings): Enamel Gloss.

- C. System 202 (Interior Wood Finishes - Enamel): Not Used.

- D. System 203 (Interior Wood Finish - Flat): Apply to utility backing boards.
 - 1. 1st Coat: Enamel Undercoater/Primer.
 - 2. 2nd and 3rd Coat: Flat Paint, - Waterborne (Vinyl Acrylic)
- E. System 204 (Galvanized Metals): Apply to exposed galvanized metal such as steel doors and hollow metal frames.
 - 1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment (if required by paint manufacturer)
 - 2. 1st Coat: Galvanized Metal Primer
 - 3. 2nd and 3rd Coats:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Gloss (if noted on Drawings): Enamel Gloss
- F. System 205 (Aluminum): Apply to interior louvers and other miscellaneous exposed unfinished aluminum surfaces (As directed by Architect, if any).
 - 1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment.
 - 2. 1st Coat: Aluminum Primer
 - 3. 2nd and 3rd Coats:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Gloss (if noted on Drawings): Enamel, Gloss
- G. System 206 (Gypsum Board, Plaster and Concrete - Wet Areas): Not Used.
- H. System 207 (Gypsum Board, Plaster and Concrete - Non-Wet Areas): Not Used.
- I. System 208 (Ferrous Metal - Chemical Resistant Finish): Not Used.
- J. System 209 (Interior Concrete Masonry - Wet Areas): Not Used.
- K. System 210 (Interior Concrete Masonry or Plaster - Extremely Wet Areas): Not Used.
- L. System 211 (Interior Concrete Masonry - Non-Wet Areas): Not Used.

3.11 SCHEDULE OF PAINT PRODUCTS

- A. Only those products which are specifically required by this Section shall be provided. Products listed in the following Schedule that are not specified in this Section are for information only.

(continued)

EXTERIOR PRIMERS/UNDERCOATERS	Benjamin Moore	Dunn-Edwards	Frazeee-SW	Glidden Profess.	PPG	Sherwin Williams	Tnemec
Red Ferrous Metal Primer							
Waterborne	V110.20	BRPR00-1RO	C309	4020	90-708	B66N00310	18
Solventborne	M06-20	---	661	4160	7-858	B50NZ3	10-99
Galvanized Metal Primer							
Waterborne	M04	UGPR00-1	C309	4020	90-712	B66W1	18
Solventborne	---	GAPR00	661	4160	6-209	B50WZ0030	66
Aluminum Metal Primer							
Waterborne	P04	UGPR00-1	C309	4020	90-712	B66W1	18
Solventborne	V131.01	GAPR00	661	4160	6-204	B50XZ30	66

EXTERIOR PAINT – FINISH COATS	Benjamin Moore	Dunn-Edwards	Frazeee-SW	Glidden Profess.	PPG	Sherwin Williams	Tnemec
Paint, Flat (Gloss Rating 0-15 @ 85 degree gloss meter)							
Waterborne (Vinyl Acrylic or 100% Acrylic)	183	SSHV10	C203	GP2250	10-Series	C01W00251	---
Waterborne (100% Acrylic)	N447	ACHS10 SSHL10	C203	GP2200	6-610XI	A-100/A06W0151	115
Paint, Gloss Level 3 (Eggshell)							
Waterborne (100% Acrylic)	N185	EVSH30	215	GP2402	6-2045XI	A82W00151	--
Solventborne	P23	---	---	---	---	---	15
Enamel, Gloss Level 4 (Low Luster)							
Waterborne (100% Acrylic - Non-Blocking)	N448	EVSH40	126	GP2402	90-474	A82W00151	6
Solventborne	P23	---	622	---	---	---	--
Enamel, Gloss Level 5 (Semi-Gloss)							
Waterborne (100% Acrylic - Non-Blocking)	N449	EVSH50	124	GP2406	6-901XI	A76W00051	30
Solventborne	V201	9 Series	628	4328	---	B54WZ-400	23
Solventborne (Industrial)	V201	9 Series	628	4328	---	B54WZ-400	23
Solventborne (Acrylic Aliphatic Polyurethane - 2 Component)	V510	Carbothane 133HB		Am450H	95-8800 Series	B65-350/B60V30	73

(continued)

INTERIOR PRIMERS/UNDERCOATERS	Benjamin Moore	Dunn-Edwards	Frazeee-SW	Glidden Profess.	PPG	Sherwin Williams	Tnemec
Red Ferrous Metal Primer							
Waterborne	V110.20	BRPR00-1-R0	C309	4020	90-708	B66N00310	18
Solventborne	P06-20	---	661	4160	7-858	B50NZ3	10-99
White Ferrous Metal Primer							
Waterborne	P04-01	BRPR00-1-WH	C309	4020	90-712	B66W00310	18
Solventborne	P06-01	43-5	661	4160	7-852	B50WZ4	10-99W
Galvanized Metal Primer							
Waterborne	P04-01	UGPR00-1	C309	4020	90-712	B66W1	18
Solventborne	---	GAPR00	661	4160	6-209	B50WZ30	66
Aluminum Primer							
Waterborne	P04	UGPR00-1	C309	4020	90-712	B66W1	18
Solventborne	P06	GAPR00	661	4160	6-204	B50WZ30	66

INTERIOR PAINT - FINISH COATS	Benjamin Moore	Dunn-Edwards	Frazeee-SW	Glidden Profess.	PPG	Sherwin Williams	Tnemec
Paint, Gloss Level 1 (Flat)							
Waterborne (Vinyl Acrylic)	275	SWLL10	C129	GP1210v	6-70	B30W04651	180
Waterborne (Low Odor/Low VOC)	N534	SWLL10	C129	GP1410	9-110	B30W02651	115
Waterborne (Low Odor/Zero VOC)	N534	SZRO10	018	GP9110	9-110	B30W02651	---
Solventborne	306	---	---	GP1310	---	---	15
Enamel, Gloss Level 2 (Low Sheen)							
Waterborne (100% Acrylic)	N537	SPMA30	126	GP1433v	---	---	6
Waterborne (Vinyl Acrylic)	274	SWLL30	125	GP1412	6-510	B24W02651	---
Waterborne (Low Odor/Zero VOC)	N537	SZRO30	029	GP9100	9-510	B20W02651	---
Solventborne	P23	---	622	GP1502	7-824	---	15
Enamel, Gloss Level 3 (Eggshell)							
Waterborne (100% Acrylic)	N538	SPMA40	---	GP1403	**6-411	A75W00051	---
Waterborne (Vinyl-Acrylic)	274	SWLL40	C132	GP1412	9-300XI	B20W4400	---
Waterborne (Low Odor/Zero VOC)	N538	---	029	GP9300	**6-411	B20W02651	---
Waterborne (Non-Blocking - 100% Acrylic)	N538	EVSH40	126	GP1403	---	B75W00051	---
Solventborne	P23	---	622	---	---	---	---

(**Not 100% Acrylic, but is their top of line product)
(continued)

INTERIOR PAINT – FINISH COATS (continued)	Benjamin Moore	Dunn-Edwards	Frazeee-SW	Glidden Profess.	PPG	Sherwin Williams	Tnemec
Enamel, Gloss Level 5 (Semi-Gloss)							
Waterborne (100% Acrylic)	N539	SPMA50	124	GP1416	6-8510	A76W00051	29
Waterborne (Non-Blocking - 100% Acrylic)	N539	EVSH50	124	GP1407	6-8510	A76W00051	---
Waterborne (Low Odor/Low VOC)	N539	SWLL50	C136	GP1456	9-510	B31W02651	29
Waterborne (Low Odor/Zero VOC)	N539	SZRO50	032	GP9200	9-510	B31W02651	---
Waterborne (2 Component Epoxy)	V440	Sanitile 255	B70-200 B60V25	98 Series	98 Series	B70-200/B60V25	113
Solventborne	271	AWLL50	628	4309	---	B54Z	23
Solventborne (Industrial)	P24	9 Series	628	4309	7-844	B54Z	23
Solventborne (Epoxy-Polyester)	---	---	B58-600 B58V600	Am235	---	B58-600/B58V600	66

END OF SECTION

SECTION 09 96 23

ANTI-GRAFFITI COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes surface preparation and field application of anti-graffiti coating systems to items and surfaces scheduled.

1.02 SUBMITTALS

- A. Product Data: For each coating system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
- B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
- C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
- D. Qualification Data: For Firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owner, and other information specified.
- E. Copy of specified Warranty.

1.03 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage Manufacturer to provide an American Polymer "Certified" applicator who has completed anti-graffiti coating system applications similar in material and extent to those indicated for Project, and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain base coatings, top coatings, and removal agent from the same manufacturer.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide anti-graffiti coating system complying with the following:
 - 1. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings during the life of the 10 year performance warranty period.
 - 2. Show no signs of deterioration, or change of appearance after graffiti removal during the warranty period. No ghosting staining or shadowing.
 - 3. Capability of removing 100 percent of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.

4. Upon graffiti removal, no evidence of graffiti shall remain.
 5. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.
 6. Shall not increase dirt pick-up of substrate.
 7. Meet the following test results for the following chemicals:
 - a. MEK No effect after 5 days
 - b. Carboxylic Acid No effect after 5 days
 - c. 75 percent Phosphoric Acid No effect after 5 days
 - d. 37 percent HCL 3 hours blister
 - e. 50 percent Sulfuric Acid No effect after 5 days
 - f. 20 percent NIT 68 hours blister
- B. Time Tested:
1. System specified must have been in successful commercial use for at least 12 years and have had a continuous City of Los Angeles Research Report number in good standing and compliance since 1991.
 2. Provide documentation of performance of the anti-graffiti coating system by written report from a nationally recognized and certified Protective Coating Specialist. Such documentation shall include; type of substrate, location, length of service, testing performed and results.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
1. Name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.06 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 40 and 100 deg F.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

1.07 EXTRA MATERIALS

- A. Furnish extra graffiti removal materials in quantities described below. Package coating material in unopened, factory-sealed containers for storage and identify with labels describing contents.
1. Quantity: One full case (12, 16 ounce bottles).

1.08 WARRANTY

- A. System Performance Warranty: Provide written warranty signed by manufacturer that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects. Refer to American Polymer Corporation 10 Year Warranty. To obtain warranty service the purchaser must contact American Polymer in writing.
1. A third party that is authorized by American Polymer must inspect project.
 2. Warranty period: 10 years from date of completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of the following manufacturer, except as otherwise approved by the Architect, subject to compliance with specifications requirements:
1. Graffiti Solution System manufactured by GSS Coatings, LLC, Sandy, Utah (801) 255-9505, www.americaonpolymer.com, or email: gordon@gsscoatings.com

2.02 ANTI-GRAFFITI COATING MATERIALS

- A. Coatings shall meet requirements of the following:
1. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours).
 2. ASTM D 530 (hardness)
 3. ASTM D 412 (tensile strength and elongation)
 4. ASTM D 522 (pass 3/8 inch mandral)
 5. ASTM 968 (abrasion test)
 6. ASTM E 96 (vapor transmission)
 7. Water clear, non-yellowing, free of waxes and urethanes.
 8. Shall allow moisture vapor transmission.
 9. VOC Classification: Materials comply with South Coast Air Quality Management District's VOC Classification.
- B. GSS-10 Undercoating: Clear VU High Solids Base Coating (AP307); a water-based high performance under coating used as sealer. Specify Sure Bond (AP308) for metal, marble, slate and tile surfaces.
- C. GSSCC Coat and Clean Top coatings: permanent anti-graffiti top coating.
1. Clear Finish: GSSCC100 Clear Matte [Matte is defined as the finish of the top coating reading less than five degrees on a Gardner Gloss Meter] or GSSCC101 Clear semi-gloss or GSSCC102 Clear gloss, as selected by Architect.
 2. Pigmented Finish (if required): GSSCC200 Pigmented Matte or GSSCC201 Pigmented semi-gloss or GSSCC202 Pigmented gloss, as selected by Architect.
 - a. Color(s) (if required): As selected by Architect.

- D. Graffiti Remover: GSS Erasol; Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which anti-graffiti coatings will be applied for compliance with coating application requirements is essential. Surface / substrates will vary and must be taken into account.
 - 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
 - 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
 - 1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding.
 - a. Confirmation of the primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.
 - 2. Notify Architect about anticipated problems before using the coatings specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of the size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating operation, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning: Before applying coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface preparation: Clean and prepare surfaces to be coated according to manufacturers written instructions for each substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
 - 2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - a. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - 3. Metal Substrates: Clean ferrous-metal surfaces that have been shop coated; remove oil, grease, dirt and other foreign substances.

- D. Material Preparation: Carefully mix and prepare coating materials according to the manufacturers written instructions.
 - 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application.

3.03 APPLICATION

- A. General: Apply coatings according to manufacturer's written instructions.
 - 1. Use applicators and techniques best suited for the material being applied.
 - a. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 - b. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.
- B. Surfaces to be Coated: All exposed exterior surfaces of CMU building walls and other exposed exterior surfaces of site Buildings as indicated on Drawings.
- C. Application Over Cementitious Surfaces:
 - 1. All natural surfaces to include concrete, all masonry units, brick tile and block should be treated with a siloxane penetrating water sealer: Aqua-lock WB Water Repellent by American Polymer is compatible with the Graffiti Solution System.
 - 2. Base: Minimum of 2 coats equaling 3 to 4 mils minimum dry film thickness, or as many as necessary to achieve a pinhole free surface of GSS Barrier undercoating as specified by manufacturer.
 - 3. Finish: Minimum of 2 coats of top coating; 3 to 4 mils minimum dry film thickness, or as many coats as necessary to satisfy warranty requirements. Number of coats may differ depending on substrate being coated.
- D. Application Over Painted Metal Surfaces:
 - 1. Finish: 2 coats of top coating; 3 to 4 mils minimum dry film thickness.
- E. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.04 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
 - a. Quantitive materials analysis.
 - b. Absorption
 - c. Accelerated weathering.
 - d. Accelerated yellowness.
 - e. Alkali and mildew resistance.
 - f. Abrasion resistance.
 - g. Washability.

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.
- B. Demonstration: Apply alkyd-based graffiti to a 2 ft. sq. treated area selected by the Architect. 5 days minimum after application, demonstrate complete removal of the graffiti in the presence of the Architect.

3.05 CLEANING

- A. Cleanup: At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.06 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
 1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
 2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes interior and exterior code required identification signage.

1.02 SUBMITTALS

- A. Product Data: Submit Manufacturer's brochures indicating materials and finishes.
- B. Shop Drawings: Show sizes of members, method of construction, copy layout, and mounting details for proper mounting for interior signage and door identification signage. Furnish template for mounting metal letters.
- C. Samples: Submit sample letters, panels, and completed signs, fonts and proposed anchorages.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 - 1. ANSI A117.1, 2009 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. 2010 ADA Accessibility Guidelines (ADAAG).
 - 4. The Arizonans with Disabilities Act (AzDA) (ARS Section 41-1492.03).

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Store items in dry, protected areas. Adequately protect against damage while stored at the site. Keep free of corrosion or other damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
 - 1. Code Required Interior and Exterior ID Signage:
 - a. ASI-Modulex www.asimodulex.com
 - b. Best Manufacturing Company www.bestsigns.com
 - c. Epic Sign Group www.epicsigngroup.com
 - d. Mountain States Specialties
 - e. Signssource www.signsource.com
 - f. Skyline Signs Inc. www.skylinesigns.net
 - g. Vomar Products, Inc. www.vomarproducts.com
 - h. Other regional source as approved by Architect.

2.02 MATERIALS

- A. Materials shall be new stock, free from defects, imperfections strength, durability, and appearance. Types of materials and colors shall be selected by Architect based on final signage design.
- B. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested in accordance with ASTM D 790, a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
 - 1. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, for background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended. Color(s) as selected by Architect.
 - 2. Transparent Sheet: Where sheet material is indicated as "clear," provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested in accordance with the requirements of ASTM D 1003.
 - 3. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected by Architect from the manufacturer's standards.
- C. Fasteners: Stainless steel with theft-proof heads.
- D. Tape: VHB (very high bond) double-stick foam tape as manufactured by 3M.
- E. Adhesive: Liquid silicone adhesive or other adhesive recommended by the sign manufacturer for type of mounting indicated.

2.03 PLASTIC SIGNAGE

- A. Fabricate signage from acrylic sheet as detailed on Drawings.
 - 1. All signage shall comply with applicable ADA requirements.
 - 2. Base: 1/8 inch thick minimum.
 - 3. Colors: As selected by Architect and in accordance with local and Federal requirements
 - 4. Mounting: Fabricate units for fastening with screws, double-stick tape or adhesive mount as indicated on Drawings or as approved by Architect.
 - 5. Finish and contrast:
 - a. Matte finish.
 - b. Characters shall contrast with background by at least 20 percent.
 - 6. Letters and Braille characters:
 - a. Raised 1/32 inch upper case, sans serif or simple serif, and accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but not higher than 2 inches.
 - b. Letters and numbers: Width-to-height ratio from 3:5 to 1:1, and stroke width-to-height ratio from 1:5 to 1:10.
 - c. Text: Required quantity of each sign shall be as directed by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Construction Manager. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. General: Locate sign units where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
- B. Install plumb and level in accordance with Manufacturer's instructions.
- C. Do not field cut any signage members.
- D. Clean and polish exposed surfaces.
- E. Wall Mounted Panel Signs: Fasten units to achieve vandal resistance by fastening with tamper-resistant headed screws, double-stick tape or adhesive mount as indicated on Drawings or as approved by Architect.
 - 1. Height shall be 60 inches above finish floor to centerline of sign at wall mounted signs, unless otherwise indicated on Drawings.
 - 2. When screw fastening, provide a minimum of 2 screws per sign, or as otherwise indicated on Drawings.
 - 3. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
 - 4. Double-Stick Tape Mounting: Clean surfaces to be joined and apply double stick tape to back of wall mounted signage in continuous strips at approximate 2 inch center to center spacing between strips. Apply sign to wall surface taking care to properly align and plumb signage before removing release paper.

3.03 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

END OF SECTION

SECTION 10 21 14

SOLID COMPOSITE TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Solid color reinforced composite toilet compartments and urinal screens as shown on Drawings and as specified of the following type:
1. Compartment Style: Floor mounted, headrail braced.
 2. Screen Style: Wall hung.

1.02 SYSTEM DESCRIPTION

- A. Performance Requirements:
1. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, "Graffiti Removal Procedure Using Manual Solvent Rubs":
 - a. Cleanability: Five (5) required staining agents shall be cleaned off material.
 2. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2197-98(2002) Standard Test Method for Adhesion of Organic Coating by Scrape Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester:
 - a. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.
 3. Impact Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2794-93(1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625" hemispherical indenter with 2-lb impact weight.
 - a. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.
 4. Fire Resistance: Partition material shall comply with the following requirements, when tested in accordance with ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
 - a. Smoke Developed Index: Not to exceed 75.
 - b. Flame Spread Index: Not to exceed 75.
 - c. Material Fire Ratings:
 - 1) National Fire Protection Association (NFPA): Class B.
 - 2) International Code Council (ICC): Class B.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings showing plans, elevations, details of construction, finish color, hardware fittings and fastenings. Indicate locations of blocking or material by others for proper attachment to supporting finished Work.
- B. Samples: Submit two (2) samples of Manufacturer's standard colors and hardware for selection and approval by Architect.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 - 1. ANSI A117.1, 2009 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. 2010 ADA Accessibility Guidelines (ADAAG).
 - 4. The Arizonans with Disabilities Act of 1992 Administrative Rules (AzDAAG).

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements; proper fit and attachment of parts is required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products of the following Manufacturers, except as otherwise approved by the Architect, subject to compliance with Specification requirements.
 - 1. Bobrick Washroom Equipment Co., Inc. www.bobrick.com.
 - 2. Equivalent or similar product as approved by Architect and Owner.
- B. Basis of Design: Bobrick 1090 Sierra Series, with vandal resistant options as manufactured by Bobrick.

2.02 MATERIALS

- A. Toilet Partition Material:
 - 1. Partitions shall be constructed of Solid Color Reinforced Composite material, which is composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti-resistant surface integrally bonded to core through a series of manufacturing steps requiring thermal and mechanical pressure. Edges of material shall be the same color as the surface.
 - 2. Toilet partitions constructed of High Density Polyethylene (HDPE) or High Density Polypropylene will not be acceptable.
 - 3. Color: As scheduled on Drawings, or if not indicated, as selected by Architect from manufacturer's full range of standard colors.
- B. Finish Thickness:
 - 1. Stiles and doors shall be 3/4 inch.
 - 2. Panels and benches shall be 1/2 inch.
- C. Hardware – General: All hardware to be 18-8, type-304 stainless steel with satin finish.
 - 1. Hardware of chrome-plated "Zamak", aluminum, or extruded plastic is unacceptable.

- D. Sliding Door Latch: 14 gauge and shall slide on nylon track.
1. Sliding door latch shall require less than 5-lb force to operate. Twisting latch operation will not be acceptable.
 2. Latch track shall be attached to door by machine screws into factory-installed threaded brass inserts.
 3. Threaded brass inserts shall be factory installed for door hinge and latch connections and shall withstand a direct pull exceeding 1,500 lbs. per insert.
 4. Through bolted, stainless steel, pin-in-head Torx sex bolt fasteners shall be used at latch keeper-to-stile connections and shall withstand direct pull force exceeding 1,500 lbs. per fastener.
- E. Hinges: 16-gauge continuous piano hinge.
1. All doors shall be equipped with self-closing hinge.
 2. Continuous piano hinge shall be attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts.
 3. Fasteners secured directly into the core are not acceptable.
 4. Door shall be furnished with two 11-gauge stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
 5. Door stops and hinges shall be secured with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
 6. Threaded brass inserts shall withstand a direct pull force exceeding 1,500 lbs per insert.
- F. Mounting Brackets: 18-gauge stainless steel and extend full height of panel.
1. U-channels shall be furnished to secure panels to stiles.
 2. Angle brackets shall be furnished to secure stiles to walls and panels to walls.
 3. Fasteners at locations connecting panels-to-stiles shall utilize through bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 lbs. per fastener.
 4. Wall mounted urinal screen brackets shall be 11 gauge double thickness.
- G. Leveling Device: 7-gauge, 3/16 inch hot rolled steel bar; chromated-treated and zinc-plated; through-bolted to base of solid color reinforced composite stile.
- H. Stile Shoe: One-piece, 4 inch high, type-304, 22-gauge stainless steel with satin finish. Top shall have 90 degree return to stile. Shoe will be composed of one-piece of stainless steel and capable of being fastened (by clip) to stiles starting at wall line.
- I. Headrail Bracing: Satin finish, extruded 0.125 inch thick anodized aluminum with anti-grip profile.
- J. Accessibility Provisions: Where shown on Drawings, provide accessible compartments, interior space as required by ADA, with outswinging doors, size as indicated.
1. Door opening size minimum 2 feet 10 inches clear, or greater where required by applicable codes.
 2. At outswinging doors, install an additional bumper on the outside of the door.
- K. Urinal Partitions:
1. Same material and construction used for toilet partitions.
 2. Size: Approximately 58 inches high, 24 inches deep, mounted 12 inches above the floor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. Install toilet compartments in strict accordance with Manufacturer's printed instructions, at locations indicated. Erect straight and plumb, with horizontal lines level.
- B. Headrail Bracing: Fasten headrail to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel sex bolts. Cadmium plated sex bolts shall not be allowed.
- C. Installed Clearances:
 - 1. Provide clearance at the wall of approximately 1 inch or less for panels and 1 inch or less for pilasters. Conceal evidence of drilling, cutting and fitting to room finish in the finish Work.
 - 2. Provide uniform clearance at vertical edges of doors from top to bottom not to exceed 3/16 inch.

3.03 FIELD QUALITY CONTROL

- A. Adjust hardware for satisfactory operation. Adjust door hinges to hold door open at approximately 30 degrees. Upon completion of the installation, put each operating component through at least ten operating cycles. Adjust to achieve optimum operation.
- B. Upon completion of the installation, visually check exposed surfaces, and touch up scratches and abrasives to be completely invisible to the unaided eye from a distance of five feet.

3.04 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 1. Toilet accessories, including anchorage devices.
 2. Mop & broom holders for janitor closets.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 1. ICC/ANSI A117.1, 2009 "Accessible and Usable Buildings and Facilities."
 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 3. 2010 ADA Accessibility Guidelines (ADAAG).
 4. The Arizonans with Disabilities Act (AzDA) (ARS Section 41-1492.03).

1.03 SUBMITTALS

- A. Product Data: Submit Drawings and brochures of toilet accessory items showing sizes, construction and mounting techniques, wiring diagrams for hand dryers, and installation locations (Plans and Elevations).

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at site.
- C. Handling: Comply with Manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. To establish function, capacity and quality, toilet accessories are based on products of Acorn Engineering Company (Stainless Steel Mirrors), Bobrick Washroom Equipment Co., Inc. (Toilet Room Accessories), and Koala Kare Products (Baby Changing Station). Comparable toilet accessory products by the following Manufacturers may be provided, as approved by the Architect, subject to compliance with Specification requirements.
 1. Acorn Engineering Company (Stainless Steel Mirrors) www.acorneng.com
 2. ASI www.americanspecialties.com
 3. Bobrick Washroom Equipment Co., Inc. www.bobrick.com
 4. Bradley Corporation www.bradleycorp.com
 5. Gamco www.gamcousa.com
 6. Koala Kare Products (Baby Changing Stations) www.koalbear.com

2.02 MATERIALS

- A. Stainless Steel: AISI, Type 302/304, with satin No. 4 finish, unless otherwise scheduled. Unless specified or indicated, the use of other stainless steel alloys shall not be allowed.
- B. Sheet Steel: Cold rolled, commercial quality, ASTM A1008. Surface preparation and metal pretreatment as required for applied finish.
- C. Chromium Plating: Nickel and chromium electro-deposited on metal, ASTM B456, Type SC 2.
- D. Galvanized Steel Mounting Devices: ASTM A123, hot-dip galvanized after fabrication.
- E. Locks: Tumbler type, keyed alike unless specified otherwise.
- F. Fasteners: Theft-proof screws. Use no adhesive mountings.
- G. Backing Plates: 16 gage cold-rolled steel for mounting grab bars in stud partitions. Refer to Drawings for sizes and locations.
- H. Perimeter Sealant: Type "E" clear mildew resistant silicone sealant as specified in Section 07 92 00.

2.03 TOILET AND BATH ACCESSORIES

- A. Toilet Accessories: As scheduled on Drawings, and as follows:
 - 1. Shelf with Mop and Broom Holders: Bobrick B-224 x 30 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination with other Work: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.02 INSTALLATION

- A. Install items in accordance with Manufacturer's published instructions and approved installation drawings in locations as shown on Drawings, and in compliance with ANSI A117.1 as applicable.
- B. Secure toilet room accessories to adjacent walls and partitions in accordance with the Manufacturer's instructions for each item and each type of substrate construction and as follows:
 - 1. Attachment to Toilet Partitions: Secure at screw attachment point with sheet metal screws furnished by Manufacturer or by 3/16 inch diameter through-bolts.
 - 2. Attachment of Surface Mounted Accessories: At solid walls, rawl plugs, expansion shields or toggle bolts shall be provided. Mirrors shall be anchored in placed with concealed theft-proof anchors as standard with manufacturer's standard details for masonry wall construction.

- C. Grab Bars:
 - 1. Solid Walls: Accurately position and attach with manufacturer's recommended masonry anchors sufficient to withstand a horizontal pull of 300 pounds. Secure concealed mounting plate to anchor plate using stainless steel machine screws furnished by the Manufacturer.
 - 2. Toilet Compartments: Through-bolted connection to anchors.
- D. Seal wall penetrations with sealant as specified in Section 07 92 00 to prevent moisture penetration through joints around fixtures.

3.03 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

END OF SECTION



EXP. 3-30-2015

SECTION 22000

PLUMBING

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. General Requirements of Plumbing Contractor:

1. Provide all labor, materials, equipment and services necessary for complete and operable installation of the Plumbing system in conformity with requirements of all Authorities having jurisdiction as indicated in the Contract Documents.
2. All Architectural drawings and specifications, fixture specifications, general, special and supplementary conditions, shall be considered a part of these specifications.
3. Prior to submitting bid, become thoroughly familiar with actual existing conditions and of the present installations to which connections must be made or which must be changed or altered. The intent of the work is shown on the drawings and described herein, and no consideration will be granted by reason of lack of familiarity on the part of the Contractor with actual physical conditions, requirements, and practices at the site.
4. Carefully check the documents of other sections to determine the requirements of any related work furnished and/or installed by that section. Provide the proper installation and/or connection.
5. Keep site free from surplus material, tools and rubbish at all times during construction period and, upon completion, leave site in clean condition.
6. Protect materials and equipment from all damage due to fire, theft, vandalism, weather, etc.

7. Repair any damage, at no extra cost to the Owner, caused to work of other sections.
8. Repair any damaged fireproofing, at no extra cost to the Owner, caused to integrity of original construction.
9. Contractor agrees that he and his subcontractors, agents, and employees will provide and maintain a safe place to work and that he and they will comply with all laws and regulations of any governmental authority having jurisdiction thereof. The Contractor agrees to indemnify, defend and hold harmless, Engineer, Owner and Architect from and against any liability, loss, damage or expense, including attorney's fees, arising from a failure or alleged failure on the part of Contractor, his and their agents, and employees to provide and maintain a safe place to work or to comply with all laws and regulations of any governmental authority having jurisdiction thereof.
10. Transmit all information required for work being performed by other sections in ample time for the proper installation and connection, and for the provision of all openings required in floors and walls.
11. Field drilling and cutting of holes in building structure required for work under this section shall be coordinated through the General Contractor and approved by Owner and Building Structural Engineer. Contractor shall bear all costs for such coordination, drilling, cutting and reinforcing costs.
12. Furnish and set all sleeves for the passage of piping through walls, roof and floors and elsewhere as will be required for the proper protection of each pipe passing through building surfaces. Coordinate this work with the General Contractor in order to properly expedite and perform this work.
13. Check the dimensional requirements of equipment to ensure that equipment can pass through the necessary areas to reach the location for installation. Include in bid costs for all work required, including any work required to move the equipment through the site to this final location.
14. Provide equipment tags per codes and authorities having jurisdiction.
15. Notify the General Contractor and Engineer in writing, within five days of award of contract, of the proposed delivery schedule of any equipment or material that may prevent the installation from being completed by the project completion date.
16. Submit a single guarantee stating that all portions of the work are in accordance with contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by Owner. Where guarantees or warranties for longer terms are specified by contract, such longer term shall apply.
17. Correct any deficiencies that may occur during the guarantee period, all to the satisfaction of the Owner, at no additional cost to the Owner within a reasonable time period. The Contractor shall be responsible for any damage caused by such deficiencies and repair thereof and reimburse the Owner for all costs incurred.

18. Carefully coordinate piping in walls with electrical contractor and mechanical contractor for locations of all piping, conduits and ductwork.

B. Major Items of Work include:

1. Cold water distribution systems including all pipe, valves, piping offsets, fittings, unions, inserts, hangers and connections to existing work.
2. Underground water storage tanks.
3. Thermal insulation and freeze protection of piping.
4. Sanitary waste and vent system including all pipe, piping offsets, connections, flanges, and connections to existing work.
5. Storm water system including all pipe, piping offsets, fittings, hangers, inserts and connections to existing work.
6. Plumbing fixtures, drains, equipment and specialties.
7. Pumps.
8. Vibration Isolation.
9. Controls.
10. Testing and balancing of all systems.

C. General Items:

1. Access Doors Panels: Provide concealed controls, valves and equipment requiring access with adequately sized access doors/panels. In removable type ceiling, provide access tile identification only.
2. Cutting and patching for plumbing work.
3. Coordinate all new work with existing installations.

1.02 REFERENCES

A. Published specifications, standards, tests or recommended methods of trade industry or governmental organizations apply to work in this section where cited below:

1. Local Codes
2. State Codes
3. IPC-International Plumbing Code
4. ASME-American Society of Mechanical Engineers
5. UL-Underwriters' Laboratory
6. AGA-American Gas Association
7. ICBO-International Conference of Building Officials
8. IAPMO-International Association of Plumbing and Mechanical Officials

1.03 SUBMITTALS

A. Submit the following to Architect:

Manufacturer's descriptive literature, operating instructions, and maintenance and repair data.

- B. All equipment and accessories shall be the product of a company regularly engaged in the manufacture of that product for at least five years.
- C. All equipment and accessories shall be new and free from defects.
- D. Supply all equipment and accessories in compliance with the applicable standards listed in article 1.02 of this section and with all applicable national, state and local codes.
- E. All items of a given type shall be the products of the same manufacturer.

1.04 DESCRIPTION OF CONTRACT DOCUMENTS

A. Specifications:

1. Specifications, in general, describe quality and character of materials and equipment.
2. Specifications are of simplified form and include incomplete sentences.
3. Words or phrases such as "The Contractor shall," "shall be," "furnish," "provide," "a," "an," "the," and "all" etc. may be omitted for brevity.

B. Drawings:

1. Drawings in general are diagrammatic and indicate scope, sizes, routing, locations, connections to equipment and methods of installation. The Drawings do not necessarily show all required offsets, obstructions or structural conditions. Locations on drawings may be distorted for purposes of clearness and legibility.
2. Scaled and figured dimensions are approximate and are for estimating purposes only, but shall be followed with sufficient accuracy to coordinate with other work and structural limitations. **DO NOT SCALE DRAWINGS.**
3. Before proceeding with work, check and verify all dimensions and carefully check space requirements with other Work to ensure that all equipment and materials can be installed in spaces allotted.
4. The Contractor shall assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
5. The Contractor is responsible for installing the work in such a manner that it will conform to the structure and architectural elements, avoid obstructions, maintain headroom, leave adequate clearance for proper maintenance and repairs, and provide clearances and access required by codes.

6. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
 7. Above items to be performed at no additional cost to the Owner.
- C. Immediately and formally notify the Architect requesting his interpretation and decision, including during bidding period, if any part of the Contract Documents appears unclear or contradictory. Do not proceed with such work without Architect's decision.

1.05 PERMITS AND INSPECTIONS

- A. The contractor shall secure all approvals and pay all fees for all work installed. Certificate shall be delivered to owner before final payment will be made.

1.06 PROJECT CONDITIONS

- A. Connections to Existing Work:
1. Install new work and connect to existing work with minimum interference to existing facilities.
 2. Temporary shutdowns of existing services shall only occur at times not to interfere with normal operation of existing facilities and only with written consent of Owner. Shutdowns shall be performed at no additional cost to the Owner.
 3. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work. HVAC, plumbing and fire protection systems shall not to be interrupted.
 4. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition including maintenance of wiring continuity as required.

1.07 QUALITY ASSURANCE

- A. Materials shall be new and free from defects and listed by Underwriters' Laboratories, Inc., (or other approved testing and listing agency) or bearing their label. Conform to codes, standards and publications listed in paragraph 1.02 References.

1.08 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Ship equipment in original packages, to prevent damaging or entrance of foreign matter.
- B. Handle and ship in accordance with manufacturer's recommendations.

- C. Provide protective coverings during construction.
- D. Replace at no expense to Owner, equipment or material damaged during storage or handling, as directed by Architect.
- E. Tag all items with weatherproof tag, identifying equipment by name and purchase order number.
- F. Include packing and shipping lists.
- G. Accessibility:
 - 1. For operation, maintenance and repair.
 - 2. Minor deviations are permissible.
 - 3. Changes of magnitude or involving extra cost are not permissible without review.
 - 4. Group concealed mechanical equipment requiring access with equipment freely accessible through access doors.

1.09 SUBMITTALS

- A. Provide one electronic copy of submittal material with descriptive data for all products and materials prior to purchase and installation, including but not limited to the following:
 - 1. Heat trace freeze protection and Insulation.
 - 2. Underground water storage tanks.
 - 3. Piping materials
 - 4. Piping accessories.
 - 5. Pumps.
 - 6. Expansion tanks.
 - 7. Drains.
 - 8. Fixtures.
 - 9. Controls.
 - 10. Vibration isolation.

1.10 MAINTENANCE MANUALS AND RECORD DRAWINGS

- A. Provide four (4) copies of operating and maintenance manual for Owner's use for each piece of equipment. Each item shall be cross-referenced and numbered with as-built drawing descriptions.
- B. Deliver to Owner, one set of mylar sepias and one bound set of blueprints and panel schedules showing work as actually installed. Label drawings "RECORD DRAWINGS."

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plumbing Fixtures (NOTE: see plans for specifications).
- B. Valves
 - 1. Stockham
 - 2. Nibco
 - 3. Milwaukee

2.02 MATERIALS

- A. Domestic Water
 - 1. Pipe:
 - a. Seamless copper tubing, type L, cold drawn, hard temper, ASTM B88 for all plumbing mains and all public buildings.
 - b. Exposed to view at plumbing fixtures, satin finish CP brass pipe with threaded cast bronze fittings.
 - 2. Fittings:
 - a. Wrought copper solder sweat type, ANSI B16.22 or brass castings, ANSI B16.18.
 - 3. Control Valves:
 - a. 125 PSI WWP, bronze non rising stem gate type.
 - b. Threaded ends similar to Stockham B-103.
 - c. Solder joint type ends, similar to Stockham B-104.
 - 4. Insulation:
 - a. All water and waste lines. (waste lines insulate lines outside only).
 - 5. Testing and Disinfection:
 - a. Pressure test in accordance with buckeye requirements.
 - b. Disinfect all hot and cold water systems.
- B. Soil, Waste and Vent (note: Plastic pipe will be approved with owner's approval).
 - 1. Pipe:
 - a. 2 in. and larger: CISPI 301 standard weight cast iron no-hub type soil pipe.

- b. 1-1/2 in. and smaller: Schedule 40 galvanized steel pipe.
 - c. Plastic pipe service weight PVC or ABS for all drain, waste, vent and rainwater piping. Note provide for expansion and contraction at roof drain piping connections.
2. Fittings:
- a. 2 in. and larger CISPI 301 standard weight cast iron no-hub type soil fittings and neoprene gasket and stainless steel bands and shield, no-hub couplings.
 - b. 1-1/2 in. and smaller: galvanized cast iron drainage type screwed fittings.
 - c. PVC or ABS glued fittings, service weight with no-hub couplings where required for connection to metallic drain outlets.
- C. Rainwater and drainage System (note: Plastic pipe will be approved with owner's approval).
1. Pipe:
- a. Piping below grade or slab-on-grade shall be service weight cast iron, no-hub pipe conforming to CISPI Standard 301-95 and ASTM Standard A-888.
 - b. Piping above slab on grade shall be either service weight cast iron, no-hub pipe conforming to CISPI Standard 301-95 and ASTM Standard A-888.
 - c. All piping service weight PVC or ABS with appropriate service weight glued fittings. Note: provide for expansion and contraction at roof drain connections.
- D.
- E. Plumbing fixtures:
- 1. See Plumbing Plans.

PART 3 EXECUTION

3.01 TESTS

- A. In accordance with the requirements of the City of Buckeye Code.

END OF SECTION



EXP. 3-30-2015

SECTION 23000

MECHANICAL

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. General Requirements of Mechanical Contractor:

1. Provide all labor, materials, equipment and services necessary for complete and operable installation of the Heating, Ventilating, Air Conditioning (HVAC) system in conformity with requirements of all Authorities having jurisdiction as indicated in the Contract Documents.
2. All Architectural drawings and specifications, fixture specifications, general, special and supplementary conditions, shall be considered a part of these specifications.
3. Prior to submitting bid, become thoroughly familiar with actual existing conditions and of the present installations to which connections must be made or which must be changed or altered. The intent of the work is shown on the drawings and described herein, and no consideration will be granted by reason of lack of familiarity on the part of the Contractor with actual physical conditions, requirements, and practices at the site.
4. Carefully check the documents of other sections to determine the requirements of any related work furnished and/or installed by that section. Provide the proper installation and/or connection.
5. Keep site free from surplus material, tools and rubbish at all times during construction period and, upon completion, leave site in clean condition.
6. Protect materials and equipment from all damage due to fire, theft, vandalism, weather, etc.
7. Repair any damage, at no extra cost to the Owner, caused to work of other sections.

8. Repair any damaged fireproofing, at no extra cost to the Owner, caused to integrity of original construction.
9. Contractor agrees that he and his subcontractors, agents, and employees will provide and maintain a safe place to work and that he and they will comply with all laws and regulations of any governmental authority having jurisdiction thereof. The Contractor agrees to indemnify, defend and hold harmless, Engineer, Owner and Architect from and against any liability, loss, damage or expense, including attorney's fees, arising from a failure or alleged failure on the part of Contractor, his and their agents, and employees to provide and maintain a safe place to work or to comply with all laws and regulations of any governmental authority having jurisdiction thereof.
10. Transmit all information required for work being performed by other sections in ample time for the proper installation and connection, and for the provision of all openings required in floors and walls.
11. Field drilling and cutting of holes in building structure required for work under this section shall be coordinated through the General Contractor and approved by Owner and Building Structural Engineer. Contractor shall bear all costs for such coordination, drilling, cutting and reinforcing costs.
12. Furnish and set all sleeves for the passage of piping through walls, roof and floors and elsewhere as will be required for the proper protection of each pipe passing through building surfaces. Coordinate this work with the General Contractor in order to properly expedite and perform this work.
13. Check the dimensional requirements of equipment to ensure that equipment can pass through the necessary areas to reach the location for installation. Include in bid costs for all work required, including any work required to move the equipment through the site to this final location.
14. Provide equipment tags per codes and authorities having jurisdiction.
15. Notify the Owner, Architect, General Contractor and Engineer in writing, within five days of award of contract, of the proposed delivery schedule of any equipment or material that may prevent the installation from being completed by the project completion date.
16. Submit a single guarantee stating that all portions of the work are in accordance with contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by Owner. Where guarantees or warranties for longer terms are specified by contract, such longer term shall apply. Provide (5) five-year compressor warranty for all air conditioning equipment.
17. Correct any deficiencies that may occur during the guarantee period, all to the satisfaction of the Owner, at no additional cost to the Owner within a reasonable time period. The Contractor shall be responsible for any

damage caused by such deficiencies and repair thereof and reimburse the Owner for all costs incurred.

B. Major Items of Work include:

1. Air conditioning systems: Equipment and controls.
2. Thermal and acoustical insulation.
3. Pipe and piping accessories.
4. Vibration Isolation.

C. General Items:

1. Access Doors Panels: Provide concealed controls, dampers, valves and equipment requiring access with adequately sized access doors/panels. In removable type ceiling, provide access tile identification only with permanent label identifying piece of equipment.
2. Cutting and patching for mechanical work.
3. Insulation: Furnish insulation for all piping, equipment and ducts that permit heat loss or gain or will form condensation.
4. Coordinate all new work with existing installations.
5. Condensate lines shall have no less than 1% minimum slope.

D. Make-up water for any industrial equipment shall first pass through an approved backflow prevention unit.

1.02 REFERENCES

A. The following published standards, codes, and specifications apply to all work within DIVISION 15.

1. AABC - Associated Air Balance Council.
2. ADC - Air Diffuser Council.
3. AMCA - Air Moving and Conditioning Association.
4. ANSI - American National Standards Institute.
5. ARI - Air-Conditioning and Refrigeration Institute.
6. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
7. ASME - American Society of Mechanical Engineers.
8. ASTM - American Society for Testing and Materials.
9. FM - Factory Mutual.
10. NEMA - National Electrical Manufacturer's Association.
11. NFPA - National Fire Protection Association.
12. OSHA - Occupational Safety and Health Act.
13. UBC - Uniform Building Code.

14. UL - Underwriters' Laboratories, Inc.
15. IMC- International Mechanical Code.
16. UPC - Uniform Plumbing Code.
17. National, State and Local Codes of all authorities having jurisdiction.
18. Local Utility Authorities.

1.03 QUALITY ASSURANCE

- A. All equipment and accessories shall be the product of a company regularly engaged in the manufacture of that product for at least five years.
- B. All equipment and accessories shall be new and free from defects.
- C. Supply all equipment and accessories in compliance with the applicable standards listed in article 1.02 of this section and with all applicable national, state and local codes.
- D. All items of a given type shall be the products of the same manufacturer.

1.04 DESCRIPTION OF CONTRACT DOCUMENTS

- A. Specifications:
 1. Specifications, in general, describe quality and character of materials and equipment.
 2. Specifications are of simplified form and include incomplete sentences.
 3. Words or phrases such as "The Contractor shall," "shall be," "furnish," "provide," "a," "an," "the," and "all" etc. may be omitted for brevity.
- B. Drawings:
 1. Drawings in general are diagrammatic and indicate scope, sizes, routing, locations, connections to equipment and methods of installation. The Drawings do not necessarily show all required offsets, obstructions or structural conditions. Locations on drawings may be distorted for purposes of clearness and legibility.
 2. Scaled and figured dimensions are approximate and are for estimating purposes only, but shall be followed with sufficient accuracy to coordinate with other work and structural limitations. **DO NOT SCALE DRAWINGS.**
 3. Before proceeding with work, check and verify all dimensions and carefully check space requirements with other Work to ensure that all equipment and materials can be installed in spaces allotted.
 4. The Contractor shall assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.

5. The Contractor is responsible for installing the work in such a manner that it will conform to the structure and architectural elements, avoid obstructions, maintain headroom, leave adequate clearance for proper maintenance and repairs, and provide clearances and access required by codes.
 6. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
 7. Above items to be performed at no additional cost to the Owner.
- C. Immediately and formally notify the Architect requesting his interpretation and decision, including during bidding period, if any part of the Contract Documents appears unclear or contradictory. Do not proceed with such work without Architect's decision.
- D. Accessibility:
1. Provide for operation, maintenance and repair.
 2. Minor deviations are permissible.
 3. Changes of magnitude or involving extra cost are not permissible without review.
 4. Group concealed mechanical equipment requiring access with equipment freely accessible through access doors.

1.05 PERMITS AND INSPECTIONS

- A. The contractor shall secure all approvals and pay all fees for all work installed. Certificate shall be delivered to owner before final payment will be made.

1.06 PROJECT CONDITIONS NOT USED

1.07 QUALITY ASSURANCE

- A. Materials shall be new and free from defects and listed by Underwriters' Laboratories, Inc., (or other approved testing and listing agency) or bearing their label. Conform to codes, standards and publications listed in paragraph 1.02 References.

1.08 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Ship equipment in original packages, to prevent damaging or entrance of foreign matter.

- B. Handle and ship in accordance with manufacturer's recommendations.
- C. Provide protective coverings during construction.
- D. Replace at no expense to Owner, equipment or material damaged during storage or handling, as directed by Architect.
- E. Tag all items with weatherproof tag, identifying equipment by name and purchase order number.
- F. Include packing and shipping lists.

1.09 SUBMITTALS

Provide one electronic copy of submittal material with descriptive data for all products and materials prior to purchase and installation, including but not limited to the following:

1. Ductless split systems.
2. Insulations and linings.
3. Pipe and piping accessories.
4. Control devices and systems.
5. Vibration isolation.
6. Provide manufacturer's written guarantee that no asbestos materials are used in any proposed materials or equipment.

1.10 MAINTENANCE MANUALS AND RECORD DRAWINGS

- A. Provide four (4) copies of operating and maintenance manual for Owner's use for each piece of equipment. Each item shall be cross-referenced and numbered with as-built drawing descriptions.
- B. Deliver to Owner, two sets of bluelines showing work as actually installed. Label drawings "RECORD DRAWINGS."

1.11 SEISMIC SUPPORT

- A. Contractor shall support and brace all new HVAC, plumbing and fire protection systems in accordance with seismic code requirements.

1.12 WARRANTY

- A. See General Condition of the Contract for Construction for general warranty provisions. Provide a (5) five year warranty on compressors for air conditioning equipment.

1.13 INDEMNIFICATION

- A. See General Conditions of the Contract for Construction for indemnification provisions.

PART 2 PRODUCTS

2.01 DUCTLESS SPLIT SYSTEM UNITS

- A. Mitsubishi
- B. LG
- C. Daikin
- D. Prior approved equivalent

2.02 ROOM THERMOSTATS

- A. Thermostats shall be *programmable, 24/7 electronic with battery backup*.

2.03 ESCUTCHEONS

- A. Provide exposed piping with escutcheons where passing through walls, ceilings or partitions.
- B. Provide sleeving for all piping that penetrates floor slabs.

2.04 HVAC WATER AND REFRIGERANT PIPING (Fan coil connections, condensate)

- A. Pipe shall be seamless copper tubing, Type L, cold drawn, hard temper, ASTM B88.
- B. Fittings shall be wrought copper solder sweat type. ANSI B16.22 or brass castings, ANSI B16.18.
- C. Joints shall be 95-5 (tin and antimony) solder.
- D. Connection between dissimilar metals shall be isolated by means of approved dielectric fittings.
- E. Testing:

- 1. HVAC:

- a. Less than 100 psi operating pressure:
 - 1) Test hydrostatically to 150 psi.
- b. Over 100 psi operating pressure:
 - 1) Test hydrostatically to 1-1/2 times operating pressure.
 - 2) Never exceed test pressure ANSI B16.1 basis.
- c. Duration: 2 hours:
 - 1) With system valves capped and pressure apparatus disconnected:
 - a) Pressure change: none.
 - b) Compensate for temperature change.
- d. Leaks and defects:
 - 1) Repair or replace as directed.
 - 2) Without additional cost.
- e. Notify the Architect in writing one week before test.
- f. Furnish written report and certification that tests have been satisfactorily completed.

2.05 SUPPORTS AND ANCHORS

A. Pipe Hangers, Supports, and Guides:

- 1. General:
 - a. Assure adequate support for pipe and contents.
 - b. Prevent vibration or swaying.
 - c. Provide for expansion and contraction.
 - d. Supports of wire, rope, wood, chain, strap perforated bar or any other makeshift device not permitted.
 - e. Comply with applicable requirements at ANSI B31.1.0 and B31.2 for piping.
 - f. Support piping so that equipment is not stressed by piping weight **or** expansion.

- g. Hangers and supports shall have minimum safety factor of three (3), based on ultimate tensile or compressive strength, as applicable, of material used.
 - h. Prime coat exposed steel hangers and supports:
 - 1) Hangers and supports located in crawl spaces, pipes shafts and suspended ceiling spaces are not considered exposed.
2. Horizontal piping, except as noted:
- a. Adjustable clevis type and rod:
 - 1) All services at or below 250 deg F.
 - b. Rollers or slide bases:
 - 1) Pipe stand, bracket, trapeze or other equivalent structural support.
 - 2) Rollers not required where spring hangers are called for.
 - c. Trapeze hangers:
 - 1) Guide individual pipes on trapezes with 1/4 inch U-bolt or Superstrut 702 pipe clamp.
 - a) Install thermal hanger shield at each support point.
 - d. Threaded steel rods:
 - 1) 2 in vertical adjustment with 2 nuts each end for positioning and locking.
 - 2) Size to 12 in IPS:

Pipe, IPS	Rod
To 2 in.	3/8 in.
2-1/2 in. and 3 in.	1/2 in.
4 in.	5/8 in.

3. Install Pipe isolators between hangers and:
- a. Uninsulated copper tubing.

- b. Wherever any pipe requires sound and vibration isolation.
- 4. Steel support components shall be separated from copper piping with plastic tape.
- 5. Spring Supports for Piping:
 - a. Minimum static deflection shall be 1 inch unless noted otherwise.
- 6. Miscellaneous Steel:
 - a. Provide miscellaneous steel members, beams, brackets, etc., for support of work in this division unless specifically included in other divisions.

B. Pipe Support Spacing:

- 1. Maximum spacing for horizontal piping:

Type of Pipe	Size	Maximum Spacing
Steel	1-1/2 in. and smaller 2 in. and larger	7 ft 10 ft
Brass or copper	3/4 in. and smaller 1- 1-1/4 in. 1-1/2 to 3 in. 4 in. and larger	5 ft 6 ft 8 ft 10 ft
Bell and Spigot (Notes 1, 2, 3)	All	10 ft
Hubless C.I. (Notes 2, 3, 4)	All	10 ft

Spacing Notes:

- Note 1. Typical of cast iron and duriron.
- Note 2. Two supports per joint.

- Note 3. Support to be within 18 inches of hub or joint.
- Note 4. Support to be placed on or immediately adjacent to coupling.
- Note 5. Additional supports at:
 - a. Changes in direction.
 - b. Branch piping and runouts over 5 ft.
 - c. Concentrated loads due to valves, strainers and other similar items.
 - d. At valves 4 in. and larger in horizontal piping.
 - e. Support piping on each side of valve.
- 2. Brace hubless piping to prevent horizontal and/or vertical movement.
- 3. Parallel piping on trapezes:
 - a. Maximum spacing to be that of pipe requiring closest spacing.
- 4. Support standpipes and fire sprinkler piping in accordance with NFPA.

C. Attachment to Structure:

- 1. Side Wall Supports:
 - a. Concrete walls: As specified for hangers.
 - b. Stud Walls:
 - 1) Toggle bolts.
 - 2) Studs welded to structural studs.
 - 3) Lag screws into wood backing.
 - 4) Other methods.

2.06 INSULATION AND LINING

A. Materials:

- 1. Insulation, jackets, facings, adhesives, coatings, and accessories shall have a fire hazard rating by Underwriters Laboratories, Inc. Steiner tunnel test method for fire hazard classification of building materials, standard UL 723, ASTM E-84, NFPA-225.
 - a. Flamespread: Maximum 25.
 - b. Fuel contributed and smoke developed: Maximum 50.

- c. Flameproofing treatments subject to deterioration due to moisture or humidity not acceptable.
 - 2. Insulation shall be Johns Manville, or equal.
 - 3. Label as required by code.
- B. All insulation applied according to manufacturer's published recommendations.
- C. Type of Insulation:
 - 1. Piping:
 - a. Refrigerant piping:
 - 1) ½" Armaflex or equivalent cellular foam insulation with all fittings covered. All taped or hot-glued sections shall be banded with stainless steel bands.

2.07 IDENTIFICATION

- A. An identification label shall be provided for the following types of equipment:
 - 1. Split ductless units
- B. Identification labels shall be by Seton, or equivalent.

2.08 ASBESTOS

- A. Absolutely no asbestos shall be allowed on the project site.

2.09 FILTER ACCESS

- A. Filters shall be mounted fully within the unit cabinet and accessible without removal of any screws (cam lock or similar is OK).

PART 3 EXECUTION

3.01 INSTALLATION OF THE WORK

- 1. It is the responsibility of the Contractor to install the work in such a manner that it will be at the highest elevation possible, conform to the structure, avoid obstructions, maintain headroom, leave adequate clearances for light fixtures, return air pathways, maintenance and repairs,

- and provide clearance and access as required by codes. Nothing shall be installed below ceiling level without Architect's written consent.
2. Above items to be performed at no additional cost to the Owner.
 3. Proceed as rapidly as the building construction will permit.
 4. Cut materials accurately, work into place without springing or forcing, properly clear windows, doors and other openings. Excessive cutting or other weakening of the building structure will not be permitted.
 5. Manufacturer's drawings and instructions shall be followed in all cases where the makers of devices and equipment furnish directions or details not shown on the drawings or described in the specifications.
 6. Drawings are not intended to be scaled, but shall be followed with sufficient accuracy to coordinate with other work and structural limitations.
 7. All work shall be properly supported from building structure and/or framing in an approved manner, independent of the ceiling support system. Where overhead construction does not permit direct fastening of supports, furnish additional framing.
 8. All equipment shall be securely fastened to building construction with approved supports.
 9. Coordinate the work of this section with the work of other sections in ample time for proper installation and connection.
 10. Carefully check space requirements, including servicing space requirements, with other sections to ensure that all equipment and materials can be installed in the spaces allotted thereto.
 11. Prepare drawings, attend meetings, obtain all approvals required by all authorities having jurisdiction, conduct required tests and obtain required permits.
 12. Cleaning:
 - a. Brush and clean work prior to concealing, painting and acceptance.
 - b. Painted exposed work soiled or damaged: Clean and repair to match adjoining work before final acceptance.
 - c. Remove debris from inside and outside of material and equipment.
 13. Cutting and Patching: As required for new work.

3.02 CONTROL DEVICES

- A. All control devices not specified to be furnished and installed under the Electrical sections shall be provided under this section.

3.03 TESTING AND BALANCING

A. General:

1. Preliminary Operation: The Owner reserves the right to operate any systems or equipment prior to final completion and acceptance of the work. Such preliminary operation shall not be construed as an acceptance of any work.

B. HVAC piping Systems:

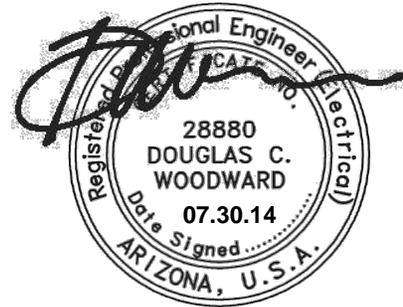
1. Less than 100 psi operating pressure:
 - a. Test hydrostatically to 150 psi.
2. Over 100 psi operating pressure:
 - a. Test hydrostatically to 1-1/2 times operating pressure.
 - b. Never exceed test pressure ANSI B16.1 basis.
3. Duration: 2 hours:
 - a. With system valves capped and pressure apparatus disconnected:
 - b. Pressure change: none.
 - c. Compensate for temperature change.
4. Leaks and defects:
 - a. Repair or replace as directed.
 - b. Without additional cost.
5. Notify the Architect in writing one week before test.
6. Furnish written report and certification that tests have been satisfactorily completed.

3.04 PROJECT CLOSE-OUT

- A. After final operation for inspection and acceptance, deliver all copies of operation instructions, maintenance manuals and parts descriptions to the Architect.
- B. All tools supplied with the equipment for maintenance shall be tagged and temporarily secured to the unit, or turned over to the Owner.

END OF SECTION

**SECTION 26 00 00
BASIC ELECTRICAL MATERIALS AND METHODS**



Expires 03.31.2016

PART 1.00 – GENERAL

1.01 RELATED DOCUMENTS

- A. The Drawings and the general provisions of the Contract, including the General and Supplementary Conditions and other Division 1 Specification Sections, apply to the work of this section.

1.02 WORK SPECIFIED HEREIN

- A. All labor, materials, equipment and services necessary to furnish and install complete electrical systems and related items of work as indicated or specified.
- B. The work in general shall consist of, but is not limited to the following:
 - 1. Panels, services, conduit, wiring, etc., for all outlets and equipment.
 - 2. Electrical service - modify as indicated.
 - 3. Telephone outlets, mounting board, conduits with pull wire, etc.
 - 4. Provide temporary electrical service in accordance with the specification, including meter and related work as required.
 - 5. Motors, controls, air conditioning and plumbing control wiring, etc., when such items are specified as work under other Sections.
 - 6. Painting as specified under other Sections, except for factory-finished material and equipment.

1.03 SUBSTITUTIONS

- A. In accordance with provisions of the specification.

1.04 QUALITY ASSURANCE

- A. Workmanship and material of electrical work shall comply with or exceed applicable provisions of the following (most recent additions including addenda and errata):
 - 1. National Electrical Code (NEC)
 - 2. National Bureau of Fire Underwriters (NBFU)
 - 3. American National Standards Institute (ANSI)
 - 4. American Society for Testing and Materials (ASTM)
 - 5. National Electrical Manufacturers Association (NEMA)
 - 6. Standards and requirements of serving utilities

1.05 SUBMITTALS

- A. Submit shop drawings in accordance with provisions of the specification for work under this Section.
- B. Submit data for review on service entrance section, panelboards, other distribution equipment, lighting fixtures, and any items substituted or deviating from the specification and drawings.
- C. When applicable, furnish Owner with 2 screwdrivers which match the type of tamper proof screws used on the Project.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Receive, accept and provide protection for all electrical equipment and materials, including that furnished by others which is to be installed or electrically connected under this section. Provide a dry storage area for lighting fixtures. Store conduit a minimum of 6" above grade and slope to drain. Cover service and distribution equipment with approved cover and secure tightly to prevent weather and other elements from damaging factory finishes.

1.07 JOB CONDITIONS

- A. Coordinate location of electric outlets, piping, ducts, and other items between trades so that there will be no interferences between lighting fixtures, piping and ducts.
- B. Provide cutting and patching necessary for the installation of the work included under this section. Cutting shall be neatly done and in no case shall openings be cut larger than necessary to allow convenient installation of the work. Provide and set thimbles for the reception of work as work progressed. Cut no columns, beams, joists or ceiling hanger rods without the written approval of the Architect. Coordinate cutting of existing construction with the Architect prior to commencing any work.
- C. Patching shall be of such materials to match the existing wall, partitions, floors and ceilings.

1.08 GUARANTEE

- A. Guarantee the electrical installation, and all work under this Section, for a period of one year from the date of final acceptance by the Owner against all evidence of imperfect workmanship or failure or malfunction of materials. Furnish this guarantee in writing to the Owner in accordance with the Specification. Work and materials found to be defective within this period shall be promptly replaced without cost. Incandescent lamps for lighting fixtures are excluded from this guarantee.

PART 2.00 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Material furnished under this contract, unless otherwise noted, shall be new, free from defects and shall conform with the standards of UL, where such a standard has been established, and shall be so labeled. Materials not UL rated and materials not specified herein, that are required to complete the electrical installation shall be of first class quality for use intended and shall be subject to Architect's approval. Items to be furnished under this Section shall be the standard product of established manufacturers regularly engaged in the production of such equipment.
- B. Provide enclosures for all equipment, suitable for intended use. For exterior areas and areas subject to water exposure use NEMA III weatherproof type enclosure.
- C. Voltage, ampere, and other ratings of equipment shall be suitable for use intended. Disconnect switches shall be properly horsepower rated and suitable for voltage applied, and ampere rating of load. Enclosures requiring opening for electrical service shall have only those openings that are necessary. For irregular surfaces increase openings and finish surfaces flat so that flush covers properly fit surfaces without deforming the covers.
- D. Raceways shall be sized according to NEC Tables 1 and 4 unless indicated otherwise.
- E. The drawings generally indicate the raceway size, the number, size, and insulation type of conductors to be provided and installed. Where these items do not meet minimum applicable codes, rules, regulations or minimum requirements for equipment being served; e.g., 3 conductors serving a 4 wire panel or a raceway too small for conductors noted, comply as required at no additional cost.

2.02 RACEWAYS

- A. Galvanized Rigid Conduit (GRC): Clifton, Pittsburgh Standard Conduit, Republic Steel Corp., Triangle Conduit and Cable Co. Inc, and Columbus Brand; including elbows and couplings.
- B. Intermediate Metal Conduit (IMC): Clifton, Pittsburgh Standard Conduit, Republic Steel Corp., Triangle Conduit and Cable Co. Inc, and Columbus Brand; including elbows and couplings.
- C. Electric Metallic Tubing (EMT): Same as GRC above.
- D. EMT Fittings: Pressed steel or malleable iron, compression type: Efcor, T & B, Appleton, Regal, or Gedney. Connectors shall have insulated throats.
- E. Flexible Metal Conduit (FLEX): Acme International Metal Hose, American Brass Sealtite, or Electrical Flex Co. Liquid tight flex shall be type UA.
- F. Flex Fittings: Same as EMT Fittings above.
- G. Rigid Non-Metallic Conduit: As manufactured by Pacific Western Extruded Products, Baldwin Extruded Products or Triangle Conduit and Cable; U.L. labeled Schedule 40 P.V.C.
- H. Non-ferrous EMT and fittings are required in any MRI exam rooms.
- I. Type MC Cable (Metal Clad Cable) or type AC cable (hospital facility cable) as manufactured by AFC or equal with full sized insulated ground (when approved by hospital).
- J. Wireways: Screw and/or hinged cover, of code gauge enameled sheet steel; Square D, Wiremold, or equal.
- K. Plastic covering: #50 Scotch Wrap.
- L. Thread Sealant: Permacel 412 Ribbon Dope.
- M. Lubricant: (To facilitate the installation of wire through raceway systems) Minerallac #100 compound.

2.03 OUTLET BOXES

- A. Outlet, Pull and Junction Boxes: By Raco, Steel City, Bowers or Appleton. Include plaster rings, covers, bar hangers and KO seals as required. Provide in accordance with following schedule:
- B. Octagon or square boxes: For all light fixtures 3/8" fixture stud fastened through from back of box for surface or wall pendant light fixtures with proper finish ring.
- C. Minimum 4" or 4-11/16" square: Galvanized steel knock-out type for all switches and receptacles. Firmly fasten to building construction set ring flush with finished surface, and keep free of foreign substance.
- D. Junction and pull boxes: Provide with screw covers located in an accessible location.
- E. Condulets: Crouse-Hindes, R & S, Appleton, Efcor, Gedney or Killark; cast ferroalloy types with sheet steel covers; provide neoprene gaskets for exterior and wet locations.

2.04 CONDUCTORS

- A. Wire and Cable: Carol Wire and Cable, General Cable Corporation, Anaconda Wire and Cable Company, Phelps Dodge Corporation, Capitol Wire and Cable or Triangle Conduit and Cable Co.
- B. Unless otherwise noted, wire and cable shall be soft drawn, annealed copper having conductivity of not less than 98% of that pure copper, uniform in cross section, free from flaws, scales and other imperfections. (Aluminum conductors where indicated). Wire sizes No. 8 and larger and conductors serving motors and subject to vibrations shall be stranded cable.

- C. Portable cords type SJO, 300 volt constant service and type SJ, 600 volt constant service shall be used as shown and as required.
- D. Insulation: Type THWN/THHN thermoplastic jacketed 90C insulated wire, through No. 6, larger sizes type THW or XHHW insulation.
- E. Sizes: Minimum wire size shall be No. 12 AWG, except No. 14 and smaller size may be used for control and signal wiring where applicable.
- F. Wire color identification: Neutral wire - white, live wire - black, red, blue on 120/208 volt system; Neutral wire - grey, live wire - brown, orange yellow on 277/480 volt system; ground - green.
- G. Fixtures connectors: Pressure type solderless connectors - Buchanan, Scotchlock, Wing Nut, or approved equal, complete with insulator and security ring.
- H. Where applicable, cover exposed taps, joints, splices with insulating material, equal to original insulation of conductor. For 600 volt or less use sufficient self- vulcanizing Okonite or electrical rubber tape covered with Manson, or electrical friction tape of highest quality.
- I. Ground Clamp Hinges: Raco, Gedney or Appleton, Grange alloy type, sizes and types as indicated or required.

2.05 SERVICE ENTRANCE AND DISTRIBUTION EQUIPMENT

- A. New gear to be free from defects, and manufactured by GE, Siemens, Square D, Cutler Hammer, or as noted on drawings..
- B. Equipment shall have space and bussing as shown and shall be fully bussed.
- C. Equipment shall be dead front standard sectional type with enclosed top, front, rear and sides with front access and shall be free standing, unless otherwise shown, and self- supporting.
- D. Equipment shall be symmetrical and so constructed that no unfinished edges are exposed. Finish shall consist of a rust-resisting prime coat on all surfaces with baked enamel factory finished exteriors.
- E. Current density in any buss shall not exceed 1,000 amperes per square inch in cross sectional area and 200 amperes per square inch areas in any bolted joint. Support cross busses, risers and jumpers at intervals with supports of sufficient strength so that bus and all components will withstand magnetic stresses of short circuit of at least 100,000 amps RMS.

2.06 PANELS

- A. Square D, General Electric, Siemens, Cutler Hammer. Interiors shall be fastened in cabinets by supports with means to provide adjustment for alignment.
- B. Boxes shall have ample side, top and bottom wiring gutters to accommodate proposed and future wiring. Provide 20" (or greater) wide boxes and covers for panelboards unless indicated otherwise.
- C. Panelboard covers: shall be made from single sheet of steel, full finished patent leveled, door struck out, trim proper width around door. Locking door-in-door construction.
- D. Panels shall have flush surface type covers with dead fronts when covers are removed.
- E. Doors shall be fastened to trim with concealed hinges and provided with flush type combination latch and lock with 3 keys each (all keyed alike).
- F. Provide and install typewritten neat circuit identification cards (8-1/2" W x 7-1/2" h) in each panel showing use of each pole. Odd numbered circuits on left side and even numbered circuits on right side.

Tie bars to form two pole breakers will not be accepted. Adjacent single pole breakers shall be opposite potential. Panels shall be furnished with ground bus when bond wires are indicated.

2.07 BUSESSES

- A. Buses for all electrical equipment shall be constructed of 98% conductivity pure electrolytic copper buss bar (hard drawn).

2.08 NAMEPLATES

- A. Provide and install with standard plate brass screws black lamicaid #7025 identifying nameplates with 3/16" high white letters on the following equipment: Panels, switchboards, mains and submains, distribution equipment and switch components, motor control center and switch components, remote safety switches, circuit breakers, time switches, contactors and starters.

2.09 SAFETY SWITCHES

- A. Square "D", G.E. or ITE Safety switches (fusible and nonfusible), heavy duty industrial type A (HD).

2.10 FUSES

- A. Furnish a complete set of Bussman fuses of proper type and rating for all switches and other devices requiring fuse protection.

2.11 STARTERS, CONTACTORS AND CONTROL DEVICES

- A. Provide starters, contactors and control devices shown and as required by Code.
- B. Starters (manual and magnetic) shall be Square "D" or comparable G.E. or Westinghouse. Furnish complete with green pilot lights to indicate equipment energized, auxiliary contacts as required, push buttons, hand-off-on switches, and control devices overload relays in each line to motors except neutral, as required to complete installation. Thermal overloads to be sized per manufacturers recommendations. Ambient compensate all heaters exposed to high temperature or installation outside.
- C. Control devices (push button stations, hand-off-auto, on-off, limit switches) Square "D", or comparable G.E. or Siemens. Time switches (astronomical) and photocells shall be Tork, Intermatic, Paragon or prior approved equal.

2.12 WIRING DEVICES

- A. Hubbell or comparable P & S, Slater, Sierra: color shall be white, or as noted on plans.
- B. Switch style shall be toggle style, or as noted on plans
- C. Receptacles: Duplex grounding type, Specification grade, 125 Volt, 20 amperes, single phase, Hubbell No. 5262 or comparable P & S, Slater, Sierra; flush - 4" square box with plaster ring and device cover; surface - 4" square box and "RS" cover.
- D. Ground Fault Interrupter Type Receptacle: Duplex grounding type, Specification grade, 125 Volt, 20 Amperes, single phase, 5 mA ground trip, feed through construction.
- E. Waterproof outlets: Taymac cover enclosure (weatherproof when in use).
- F. 15 amp devices allowed only when specifically denoted on electrical construction drawings.

2.13 WALL PLATES

- A. Wall plate shall be provided for each switch, receptacle, signal and telephone outlet and special purpose outlet. Sectional gang plates shall not be used. Multi-gang outlet plates shall be used for multi-gang

boxes.

- B. Device Plates: Stainless steel, or as noted on drawings. Hubbell, A.H. & H., P & S, Sierra, or Slater. Provide nameplates for all special purpose receptacles and switches and for all switches in gangs of three or more. Special coverplates to match device color (e.g. red device on emergency power to have red nylon coverplate).
- C. Provide label at all receptacles (1/4" black text on clear tape) designating panel and circuit origination.

2.14 LIGHTING FIXTURES

- A. As per Lighting Fixture Schedule.
- B. Provide lighting fixtures shown which shall have all parts including plaster frames for recessed fixtures and fittings necessary to completely and properly install fixtures. Lighting fixtures shall be prewired type.
- C. Verify ceiling construction, recessed depth, etc., prior to ordering fixtures.
- D. All recessed incandescent lighting fixtures shall conform to Article 410-65 © of the NEC.
- E. Lighting fixtures shall be complete with lamps. Provide lamps of size, type and quantity required to lamp fixtures, unless smaller sizes are shown. If lamps are ballasts noted are not of the type suitable for specified fixture, notify the Architect and provide proper lamps and ballasts as required at no additional cost.
- F. Finishes except as otherwise noted in schedule shall be top quality organic baked enamel, applied over iron phosphate rust inhibitor, after five-stage washing and phosphatizing process. Minimum enamel thickness shall be 1.5 mils, average reflectance shall be not less than 85%.
- G. Lampholders in all fixtures shall be mounted to 18 gauge socket bracket. Bracket and lampholders shall be reinforced by end of electrical chassis to prevent spreading.
- H. Incandescent Lamps: General Electric, Sylvania, Westinghouse, or ITT, 130 volt, extended life lamps, wattage and types as required by fixture.
- I. Fluorescent Lamps (T-8): General Electric, Sylvania, Westinghouse, Phillips, or ITT, energy saving type, as specified on drawings. drawings. Minimum CRI of 80.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. The entire electrical installation shall be made in a neat, approved, workmanlike, finished and safe manner. Conceal all wiring in finished areas. The entire installation shall be subject to the Architect's approval.
- B. Remove all tools, scaffolds, scrap and surplus materials promptly upon completion of any portion of the work. Keep all areas clean of waste and debris.
- C. Minimum installation requirements shall be in accordance with manufacturer's written up-to-date installation recommendations.
- D. Inspect and make tight all connections for all equipment, including factory connections. Torque all connections per manufacturer's recommendations.
- E. Construct and brace equipment, materials, etc., to minimize unnecessary and undesirable rattling and vibration in all electrical systems.
- G. Drawings showing electrical work are generally diagrammatic and are not intended to show in detail all

features of work. No extra payment will be allowed where obstructions in work of other trades or work under this section require offsets, etc. Check location of electrical work to determine in advance that it clears all openings and structural members, that equipment will be properly concealed and that equipment clears cabinets, fixed equipment, windows, door openings, or other obstruction.

- H. Notify serving agencies prior to time work is started and submit plans, specifications, shop drawings and other related work as required, including the providing and installing of required materials to complete all systems.
- I. Lighting fixtures installed and used for lighting during construction shall be relamped with new lamps just prior to final acceptance of the Project.
- J. Install seismic restraint devices for all ceiling mounted equipment, i.e. fluorescent lay-in type ceiling fixtures in modular type ceilings. Provide grid clips and #12 slack wires from fixture corners to structure.
- K. Flush mounted equipment, panels, junction and outlet boxes, etc., shall mount within 1/8" of finish surface. Where too deep to completely recess, provide approved finished wood or approved trim and fill space between finish surface and panel trim as directed by Architect.
- L. Free standing and self-supporting equipment shall be anchored (bolted down) to a 6" (exterior) 4" (interior) raised concrete slab. Where equipment is not free standing type, anchor to wall with approved type mounting support as required.
- M. Method of supporting fixtures shall be subject to Architect's approval.
- N. Where fixture stems are used, they shall be one continuous uniform stem.
- O. Provide wiring to time switches and photo cells as required, and set time switches and adjust photo cells as directed by Architect.
- P. Where two or more conduits run to a single outlet box, each circuit shall be color coded as a guide in making connections colors shall be carried continuously throughout the system. If more than one multiwire branch circuit is carried through a single raceway. All circuit conductors of the same color shall be connected to the same feeder conductor throughout the installation.
- Q. Deviations from conduit runs will only be permitted with the Architects approval. Combining circuits in single conduit is permitted with proper identification and wire and conduit size increase required by NEC.
- R. Provide all conduit, wiring and connections for equipment furnished by the Owner or under other Sections, including line and low voltage wiring for the cooling and heating equipment compressor wiring. Obtain required information from the other trades and rough-in to meet requirements of said equipment. No allowance will be made for failure to comply with obtaining complete information from other trades.

3.02 RACEWAYS

- A. Install approved complete raceway systems for all electrical conductors including conductors for telephone, signal, control and other systems required by applicable codes, rules and regulations.
- B. Unless otherwise noted, install all raceways concealed, generally in furred spaces, walls, or below floors, in roof insulation, below grade or other approved available spaces. Where it is not feasible to conceal raceways, they shall be installed as directed by Architect.
- C. Where exposed raceways are permitted by Architect in finished areas, paint as directed by Architect and use approved escutcheons where entering or leaving finished areas.
- D. Raceways shall not be installed in close proximity to any steam pipe, hot water pipe, heating duct or appliance or areas subject to heating above temperature rating of conductors installed in raceways. If conductor insulation types are not noted, verify for compliance prior to installation of raceways. In no case shall raceways be installed within 3" from outside finish covering of pipes or ducts being crossed.
- E. Install exposed raceways to run parallel or at right angles to structural building lines with neat bends

where required and neatly offset into points or terminations.

- F. In empty raceway provide and install a No. 14 nylon drag line or approved equal pull wire with adequate slack at each end to facilitate the installation of future electrical conductors.
- G. Install approved expansion joint type fittings in raceway systems crossing building expansion joints and as recommended by raceway manufacturer where expansion is caused by temperature changes or similar type conditions. Expansion fittings to maintain approved raceway system (provide bonding jumpers as required). The minimum size approved conduit type raceway shall be $\frac{3}{4}$ " trade size.
- H. Install raceways with approved heavy duty supports, straps, hangers, connectors, and couplings, as required to maintain an approved installation. Raceways shall have independent supports from building or similar structure only. Do not support raceways from other crafts pipe, pipe supports, ducts, ceiling support wires or other related equipment. Wire or perforated strapping shall not be used for hanging conduit.
- I. Support vertical runs of raceways on heavy steel clamps. Bolt clamps tightly around the conduit and rest securely on the building structure without blocking. Place clamps below couplings.
- J. Make all raceway bends without collapse or injury and make bends for telephone raceway systems with large radii sweep type bends. Verify size of radii required for serving agency.
- K. Flash raceways extended through roof and similar areas in accordance with Roofing Specifications.
- L. Carefully ream raceway ends to remove all burrs. Cut ends of raceway at right or proper angle to length of raceway and install to butt flush into couplings or fittings. Cap all conduit raceway ends as soon as installed and deep free of foreign substances. Use approved type caps for use intended. Make no more than 4 quarter bends, pockets or depressions in a continuous run of conduit raceway, install up and over obstructions rather than down and under.
- M. Swab clean, dry and remove any foreign materials from raceways prior to installation of any electrical conductors.
- N. Unless otherwise indicated where conduit raceways enter or leave the top of a concrete slab, it shall be accomplished with an approved hot dipped galvanized rigid steel (heavy wall) coupling installed flush to $\frac{1}{4}$ " below finish floor level. Extend conduit raceways from flush coupling as required to complete run.
- O. Install raceways below grade a minimum of 24" below finish grade, or a minimum of 3" from surface of raceway to bottom side of 4" thick or greater concrete slabs poured on grade.
- P. Do not install conduit raceways in concrete slabs. Provide double reducing washers where conduit raceways enter oversized and concentric knockout openings. Provide insulation and insulated grounding bushing as required for all conduit raceway systems.
- Q. Do not install raceways where they will be subject to injury or damage; e.g., sharp rocks, in bottom of trench or backfill.
- R. Support Underground conduit runs or banks on preformed, nonmetallic separators, Spacing between exterior surfaces of conduits generally shall be not less than the following:
 - 1. Between telephone conduits: 2"
 - 2. Between conduits containing conductors at not over 600 volts: 2"
 - 3. Between telephone conduit and power conduit in same envelope: 6"
- S. Spacing between separators shall not exceed 5 feet and be close enough to prevent sagging of conduits and breaking of couplings and watertight seals.
- T. Raceways shall not be covered until approved by the Architect.
- U. Where an underground conduit, without a concrete envelope, enters the building through a

nonwaterproofed wall or floor, a sleeve made of Schedule 40 galvanized pipe shall be filled with a suitable plastic expandable compound or an oakum and lead joint on each side of the wall or floor in such a manner as to prevent entrance of moisture.

- V. Mark underground stub out with concrete monuments (8" x 8" x 8") installed 1" below finish grade, over but not in contact with capped ends. Identify capped empty raceway with linen tags located inside of raceway ends. Pitch all conduits uniformly to manholes to eliminate pockets. All joints shall be watertight.

3.03 GALVANIZED RIGID CONDUIT (GRC)

- A. All raceways shall be GRC for entire installation except as noted or shown. Rigid steel conduit, elbows, standard couplings shall be hot dipped galvanized rigid steel. If partitions or walls are solid concrete or are grouted solid with concrete or mortar, rigid steel conduit shall be used, also where subject to injury or damage; e.g., consider area up to 4 feet above floor level subject to injury. Verify these areas prior to installation.
- B. Double locknut, one inside and one outside rigid conduits entering cabinets, pull boxes and outlet boxes. Provide bushing.
- C. Apply thoroughly, thread sealant to male threaded ends of metallic raceways installed below grade, in concrete or mortar, or in wet type locations. Running threads shall not be used.

3.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. IMC raceway and approved fittings where permitted by applicable codes and regulations may be used in lieu of rigid steel conduit, where installed above finish grade and above concrete slabs on grade.

3.05 ELECTRIC METALLIC TUBING (EMT)

- A. EMT may be used where concealed in areas above ceilings, furred spaces, partitions or walls.

3.06 FLEXIBLE METAL CONDUIT (FLEX)

- A. Use flexible conduits for connections to motors and where other electrical equipment is subject to movement, vibration, misalignment, cramped quarters or where noise transmission is to be eliminated or reduced. Length shall be adequate, but not to exceed 30". Flexible conduits and fittings used to meet the above requirements shall in addition be of the liquid-tight type when installed under any of the following conditions:

3.07 EXTERIOR LOCATIONS

- A. Moisture or humidity laden atmospheres where it is possible for condensation to accumulate.
- B. Where water or spray due to washdown operation is frequent or possible.
- C. Wherever there is a possibility of seepage, dripping, etc., of oil, grease or water.
- D. Where permitted by Code and with written approval of Architect, flex may be used where the installation of rigid steel conduit and EMT are not feasible. Where flex is installed in runs over 4 feet in length, it shall be tight with a minimum of slack.

3.08 RIGID NONMETALLIC CONDUIT

- A. PVC Schedule 40 may be installed for direct burial raceways where installed a minimum of 24" below grade.
- B. PVC bends up to 45 degrees per manufacturer's recommendation. All larger bends shall be rigid galvanized conduit, wrapped with plastic tape half lapped. Make transition to rigid conduit with approved

fittings. PVC conduit may be used for branch circuits under floor slabs. PVC above grade is not acceptable.

- C. Encase all bends in concrete (3" minimum coverage on all sides).

3.09 WIREWAYS AND FITTINGS

- A. Wireway and fittings installed on exterior and where subject to water or similar conditions shall be raintight type construction without knockouts, constructed from galvanized sheet steel.

3.10 OUTLET, PULL AND JUNCTION BOXES

- A. Provide boxes installed rigid and true where shown or as required. Prior to installation of boxes; such as wall switch boxes, verify size, location dimensions and door swings (switches shall be on strike side of door unless directed otherwise by the Architect). Provide necessary hangers or grout into masonry as required.
- B. Unless otherwise shown or as directed prior to installation, outlet boxes shall generally be placed at the following heights, center of box to finished floor level.
- C. Wall Switches: 44".
- D. Convenience Receptacles: 18" mounted horizontally (or above cabinets) and/or as noted. (Similar type outlets shall be mounted at same height in each area). Grounding pin at top.
- E. Provide gang devices wherever possible, and provide partitions for gang boxes where conductors of different voltages and system enter same box. Verify equipment sizes and requirements with supplier of equipment prior to rough-in and setting of boxes.
- F. Boxes shall have open holes only when necessary. On finished surface, plaster rings shall be used on outlet boxes. The size and kind of boxes, plaster rings and junction boxes required shall be determined by purpose for which it is to be used, and shall be subject to Architect's approval.
- G. For exposed wiring on the exterior of building and on interior of building where subject to water, use cast ferroalloy type boxes with weatherproof covers, and neoprene gaskets, and for other exposed wiring on the interior of building, use code gauge 4" square or larger galvanized boxes and ½" raised steel cover plates.

3.11 CONDUCTORS

- A. Use specified color schedule for all wiring. Where large conductors are not available in colors, identify with permanent colored plastic tape at all terminations, junction boxes, etc. color coding as per NEC and Owner's requirements.
- B. Identify all conductors by number with wraparound cloth wire markers in all manholes, junction boxes, pull boxes and at all terminations and junctions.
- C. Make taps, joints, splices, and other connections with fixture connectors.
- D. Make splices and taps only when required and as directed in approved locations, such as within junction boxes, or wireway.
- E. Do not install wiring, including fish tapes, and pull wires, in raceways until raceway system is complete, clean and dry and free of all foreign materials. Lubricate as required with specified lubricant.
- F. Solder all stranded conductors sizes #10 and smaller prior to making joint with connectors.
- G. Conductors serving motors or subject to vibration shall terminate to screw or similar type connections with approved crimping type terminals.

3.12 LIGHTING FIXTURES

- A. Install all lighting fixtures at locations indicated.
- B. Leave fixtures and lamps clean of all dirt, dust, grease spots and debris and all glass, plastic and other components, unscratched and unbroken.
- C. Fit and adjust all fixtures. Where structural conditions, partitions, furniture, shelving, and air conditioning diffusers interfere with the lighting fixtures at locations shown, notify Architect in writing and relocate at no additional cost as directed. Coordinate lighting fixtures with ceiling patterns as directed.
- D. Where unmarked outlets are shown notify the Architect and install fixtures complete with lamps similar to fixtures in similar areas at no additional cost as directed by the Architect.
- E. Fixtures with finish trim or lens frames shall be gasketed and baffled to prevent light leaks. Install so that no light leaks exist.
- F. Fixtures mounted directly on combustible low-density ceilings shall have UL approval for this condition and be plainly marked so indicating. Fixtures and components requiring additional requirements to comply with all code requirements shall be provided under this section at no additional cost.

3.13 GROUNDING

- A. Grounding for distribution equipment, equipment and materials with electrical connections, secondary wiring of transformer, transformer enclosures, electric motor frames, electric raceway and related equipment, shall be effectively and permanently grounded in accordance with pertinent Sections of Article 250 of NEC. Resistance to ground shall not exceed 25 ohms.
- B. All raceways shall have an approved size insulated (green in color) copper grounding type conductor installed in raceway.
- C. Where raceways connect to a concentric K.O. provide grounding locknut or bushing and bond wire extended and bonded to enclosure, size as per NEC.

3.13 DITCHING, EXCAVATION AND BACKFILLING

- A. Perform all ditching, excavation and backfilling required for the electrical work. The conditions governing the excavation for electrical facilities shall be in accordance with the specification.
- B. Extreme care shall be taken in establishment of the exact depths and routing of underground electrical facilities so not to conflict or damage existing or new underground water, sewer, heating or other service lines. Provide and maintain all sheathing, bracing and proper guards for prevention of accidents.

3.14 FUTURE WORK

- A. Where provisions are made for future work the installation shall be made so that a minimum amount of work would be required to accomplish the future work; e.g., future conduit stubouts from a distribution section, panel, etc., shall be arranged so that future conductors may be installed without the removal or the interiors, components and conductors, etc. Coordinate and install servicing, operating and removal space for all equipment.
- B. Mark underground stub out with concrete monuments (8" x 8" x 8") installed 4" below finished grade, over but not in contact with capped ends. Identify capped empty raceway with linen tags located inside of raceway ends.

3.15 FINAL INSPECTION TESTS

- A. Furnish all meters, cable, connections, apparatus, etc., necessary for making tests under this Section,

subject to Architects's approval.

- B. Test system for shorts and grounds. Faulty wiring shall be removed and replaced. After system is connected complete, test for insulation resistance. Resistance lower than outlined in the NEC, manufacturer's data, etc., shall be removed and replaced. Any device, apparatus or fixture under this contract showing substandard readings shall be removed and replaced as directed by the Architect.
- C. All equipment shall be tested by taking ampere readings per phase, speed by means of direct reading tachometer, full load and no load voltage with 1/2% voltmeter. Record all readings and deliver to Architect for review.

END OF SECTION

